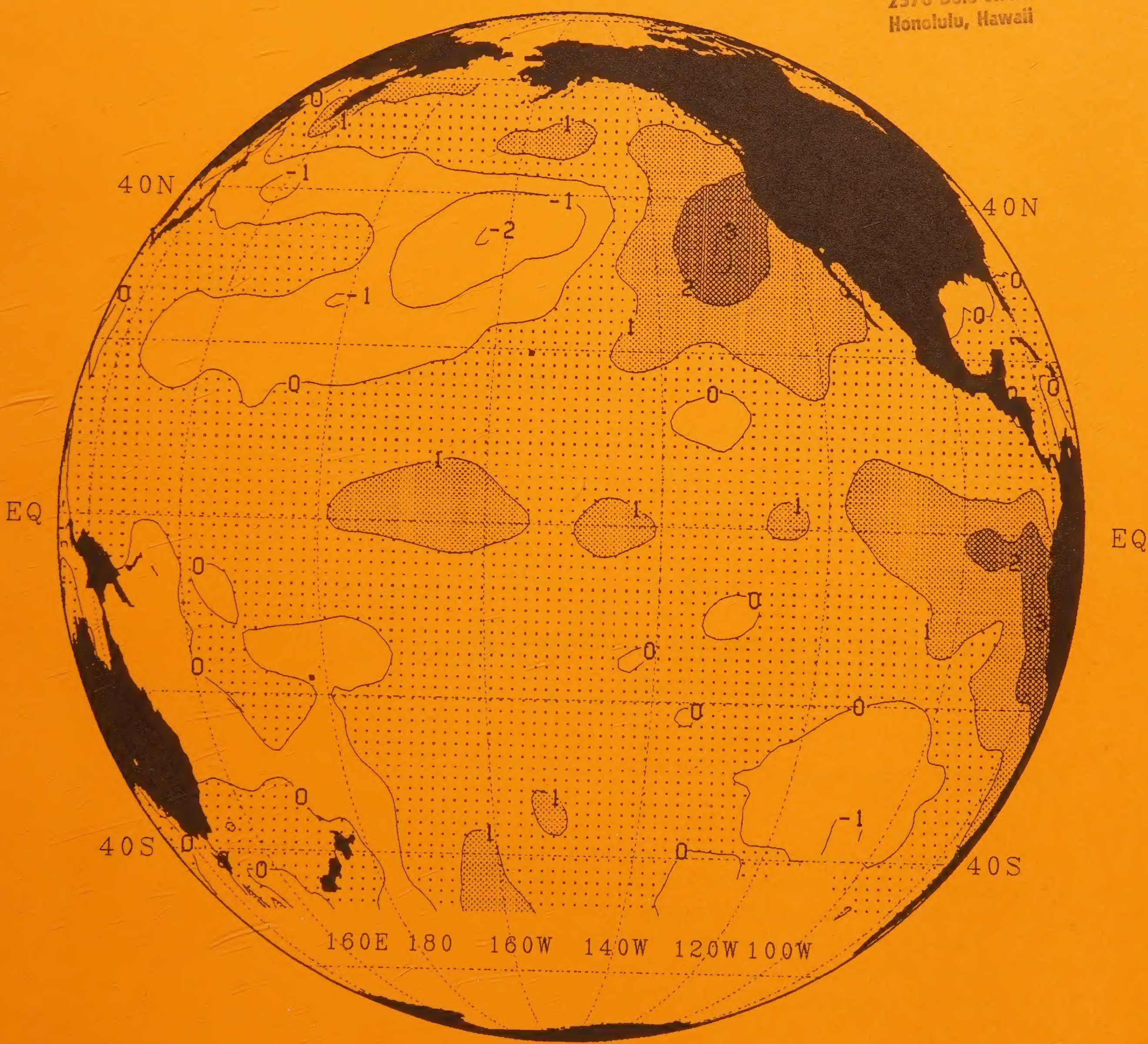
気象庁海洋月報

Monthly Ocean Report

May 1997 (No. 53)



Climate and Marine Department
Japan Meteorological Agency

気象庁 気候・海洋気象部

平成9年5月

気象庁海洋月報は、気象庁 気候・海洋気象部 海洋課で作成されています。

本月報に関する問い合わせは、

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Monthly Ocean Report is prepared by the Oceanographical Division, Climate and Marine Department, Japan Meteorological Agency.

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表紙は、1997年5月の太平洋の月平均海面水温偏差図です。
陰影部は、平年より高温の海域を示しています。

The figure on the front cover shows the monthly mean SST anomalies for May 1997 in the Pacific Ocean.
Areas of positive anomalies are shaded.

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海況の特徴（１９９７年５月）

日本近海の海況

海面水温は本州東方で平年より1℃以上低かった。本州南方から東シナ海にかけては平年より0.5℃以上高く，四国沖及び東シナ海北部では平年より１℃以上高かった。日本海は平年並だった（第４図）。

黒潮は，140˚ E以西については，九州から紀伊半島にかけて接岸して流れた後，八丈島付近を流れていた。140˚ E以東では，上旬は34˚ N付近を東進していたが，中旬以降は房総半島沖を北東進し，常磐沖に達した後，南下し，144˚ E付近からは，34˚ N付近を東へ流れていた（第9図）。

本州東方の親潮系の冷水は37.8˚ N，143.6˚ Eまで達していた（第5図）。

太平洋の海況

太平洋熱帯域の海面水温は，日付変更線付近から140˚ Wにかけてと120˚ W以東で平年より1℃以上高く，100˚ Wから南米沿岸にかけては平年より2℃以上高かった。

北太平洋中緯度の海面水温は，20˚ N以北140˚ W以東の海域で平年より1℃以上高く，30˚ N，130˚ W付近では平年より3℃以上高かった。また，50˚ N以北及び日付変更線以西の30˚ Nに沿った海域では平年より0.5℃以上高かった。一方，日付変更線以西の40˚ Nに沿った海域及び日付変更線から150˚ Wまでの20～40˚ Nでは平年より１℃以上低く，35˚ N，160˚ W付近では平年より2℃以上低かった（第16図）。

Highlights May 1997

Seas adjacent to Japan

SSTs were more than 1°C below normal east of Honshu. Positive SST anomalies more than +0.5°C prevailed from south of Honshu to the East China Sea, and those more than +1°C were found off Shikoku and in the northern part of the East China Sea. SSTs were near normal in the Japan Sea (Fig. 4).

The Kuroshio flowed along the coast of Kyushu and Shikoku, then flowed near Hachijo Island. In the region east of 140°E, it flowed eastward along 34°N in the first 10-day of the month. During the rest of the month, it flowed northeastward off Boso Peninsula, then turned southward off Joban and flowed eastward along 34°N from 144°E (Fig. 9).

The Oyashio cold water extended southward to 37.8°N, 143.6°E (Fig. 5).

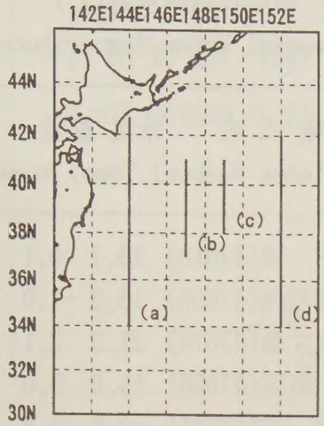
Pacific Ocean

In the equatorial Pacific, positive SST anomalies more than +1°C prevailed from the date line to 140°W and east of 120°W, and those more than +2°C were found from 100°W to the South American coast.

In the middle latitudes of the North Pacific, positive SST anomalies more than +1°C prevailed north of 20°N and east of 140°W, and those more than +3°C were found around 30°N, 130°W. SSTs were more than 0.5°C above normal north of 50°N and along 30°N west of the date line. Negative SST anomalies less than -1°C were found along 40°N west of the date line and from the date line to 150°W between 20°N and 40°N. Negative SST anomalies less than -2°C were found around 35°N, 160°W (Fig. 16).

観測船による北太平洋中層水の形成・変質過程の調査

Investigation of the formation and changing process of North Pacific Intermediate Water by research vessels



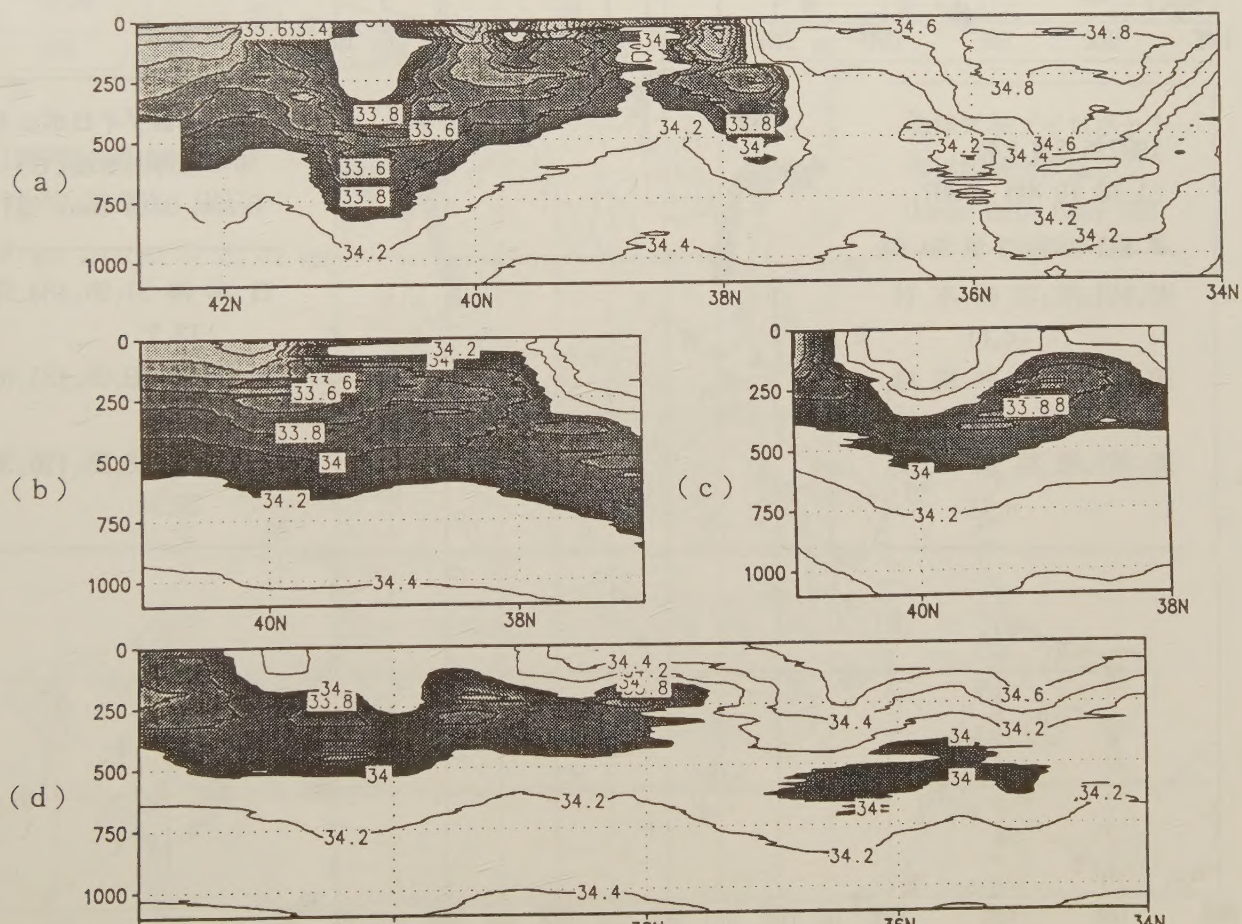
図A　海洋観測定線（1997年春季、凌風丸、高風丸）

Fig. A Oceanographic observation lines in the spring of 1997 by R/V Ryofu Maru (c,d) and Kofu Maru (a,b).

北太平洋亜熱帯循環域の中層に広く分布する、塩分極小によって特徴づけられる北太平洋中層水は、その源である亜寒帯域表層の冬季の年々変動を亜熱帯域の中層までもたらしていると考えられており、その形成・変質過程の把握は、気候変動への海洋の役割の解明に重要である。気象庁では、北太平洋中層水の形成域と考えられている本州東方海域において、凌風丸、高風丸によるＣＴＤを中心とした高密度の海洋観測を実施し、北太平洋中層水の形成・変質過程を把握する調査を 1997 年度から開始した。図Ａは、 1997 年春季に実施した観測線を、図Ｂはその塩分断面を示している。

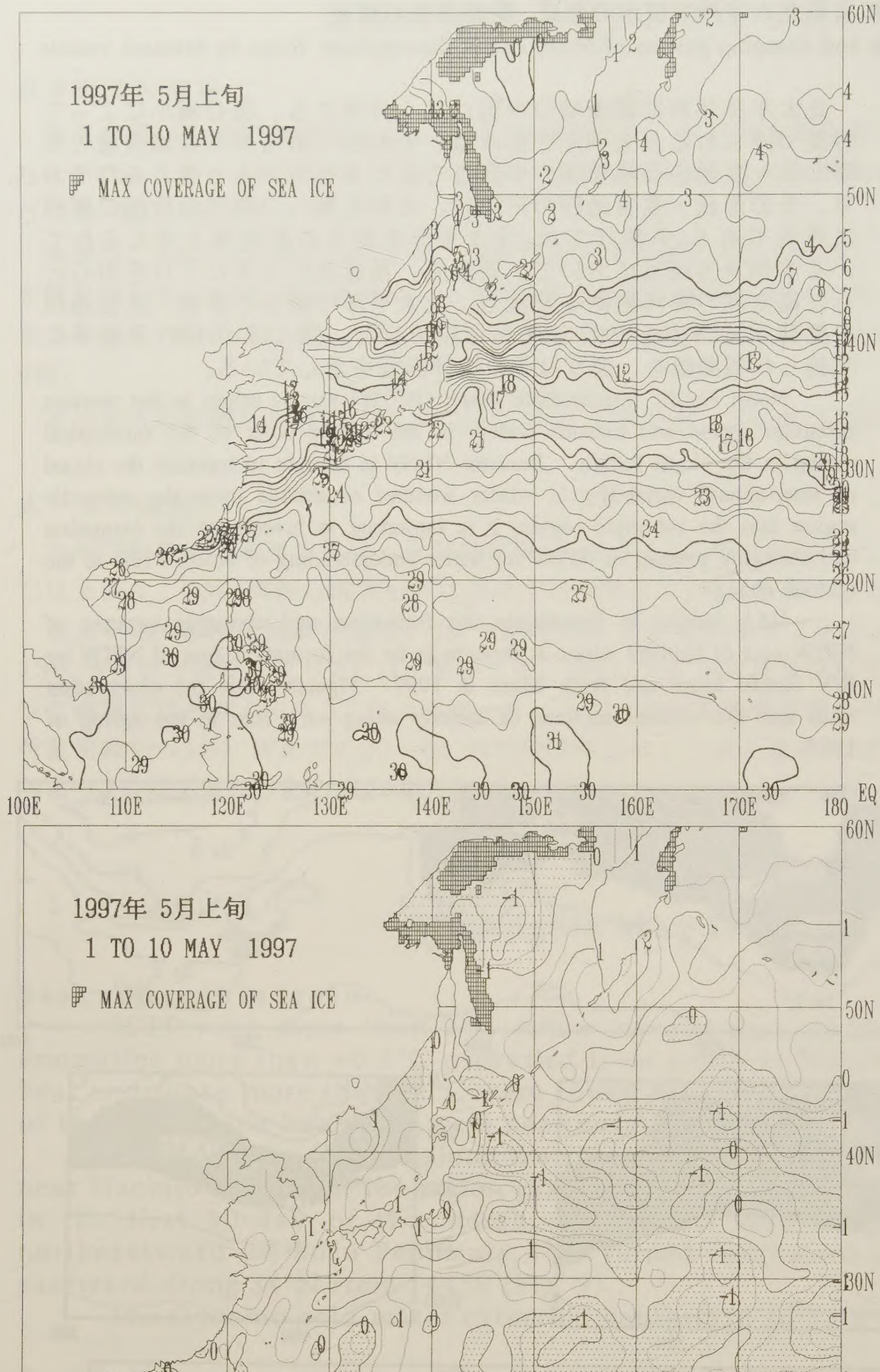
North Pacific Intermediate Water (NPIW) has its origin in the western subarctic region and extends widely in the middle layer of the subtropical region in the North Pacific. Because NPIW is thought to transmit the signal of inter-annual variability in winter weather conditions upon the subarctic region into the subtropic region, it is important to investigate the formation and changing process of NPIW for better understanding of ocean's role in the climate change.

JMA started to investigate the formation and changing process of NPIW east of Honshu where is thought to be the formation area of NPIW by R/V Ryofu Maru and Kofu Maru in 1997. Figures show the observation lines and the vertical sections of salinity along each line in the spring of 1997.



図Ｂ (a) ～ (d) の各定線における塩分の鉛直断面図 (psu)、陰影部は塩分 34.0 以下を示す。

Fig. B Vertical sections of salinity (psu) along the lines shown in Fig. A.
Values less than 34.0 are shaded.



第1図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1997年 5月上旬)

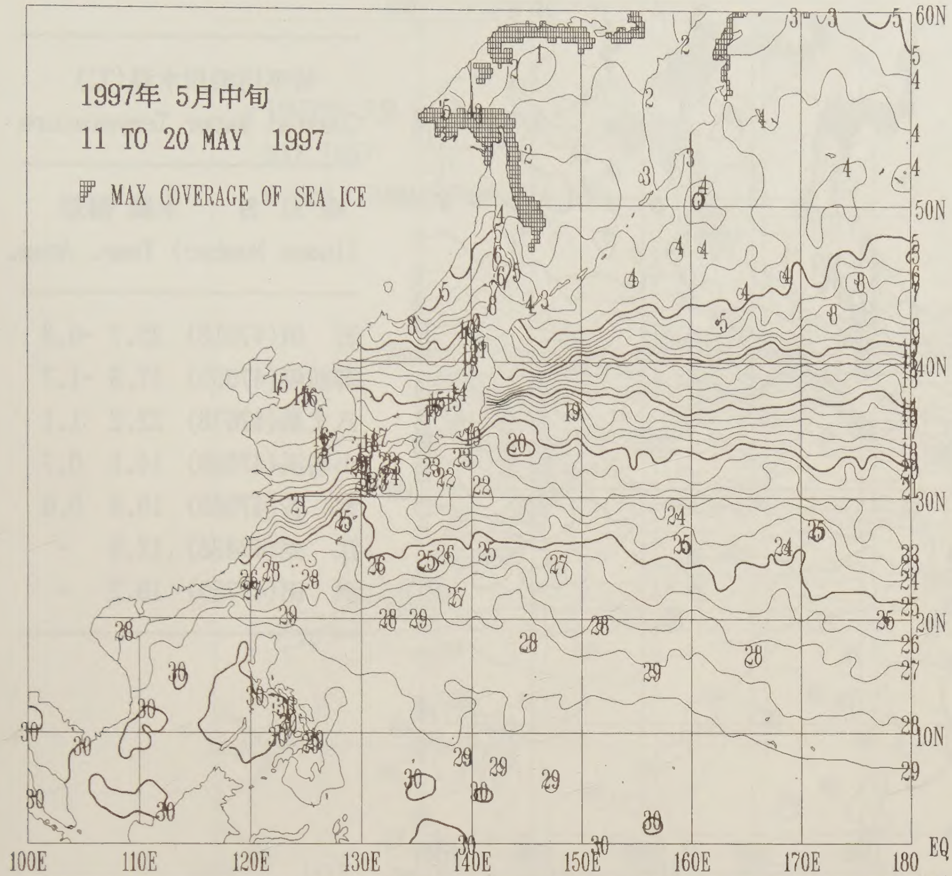
Fig.1 Ten-day mean SSTs in the western North Pacific (top) and anomalies (bottom) for the 1st ten-day period in MAY 1997. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown as broken lines. Negative anomalies are spotted.

旬平均沿岸水温(℃)
Coastal Water Temperature

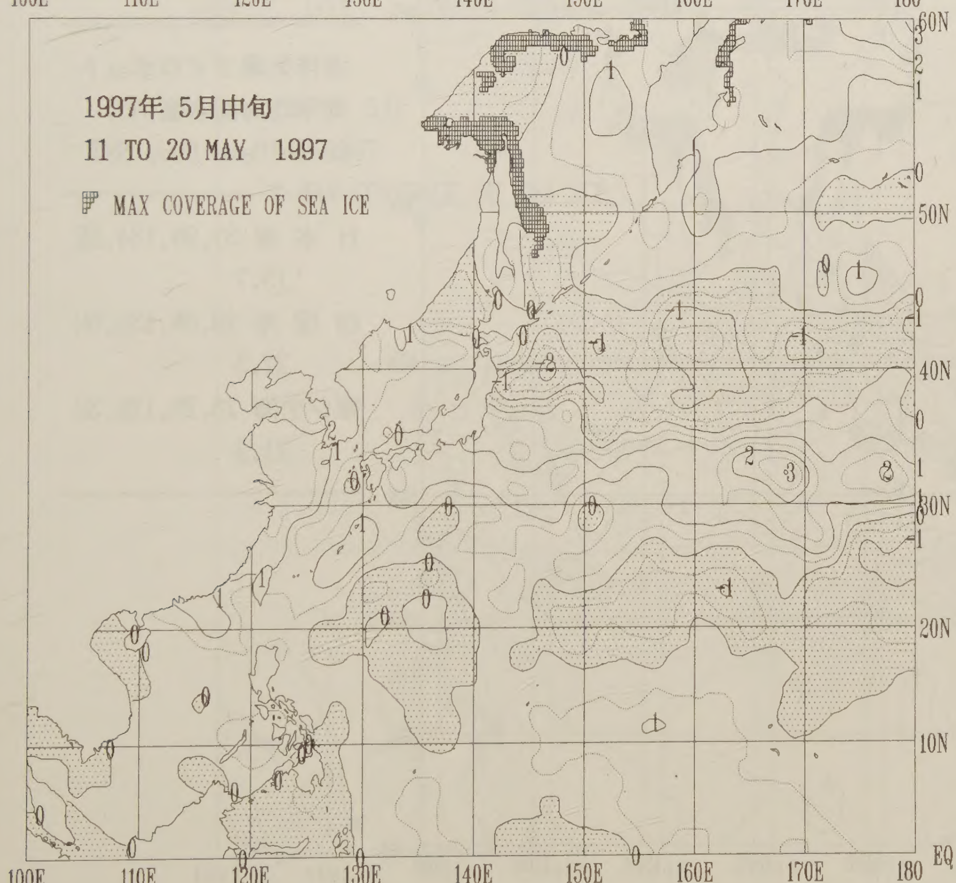
地点名 (Index Number)	水温 Temp.	偏差 Anom.
石 垣(47918)	25.7	0.1
御前崎(47655)	16.5	-1.0
八丈島(47678)	21.9	2.1
小名浜(47598)	15.0	3.0
宮 古(47585)	9.0	0.8
江 差(47428)	10.0	-
浜 田(47755)	17.6	-

海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

日本海	37.9N,134.5E	13.7
四国沖	29.0N,135.0E	22.8
東シナ海	28.2N,126.3E	22.3



旬平均沿岸水温(℃) Coastal Water Temperature		
地 点 名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	26.6	0.4
御前崎(47655)	17.1	-1.5
八丈島(47678)	22.1	1.4
小名浜(47598)	14.3	1.4
宮　古(47585)	9.9	0.8
江　差(47428)	11.7	-
浜　田(47755)	18.7	-

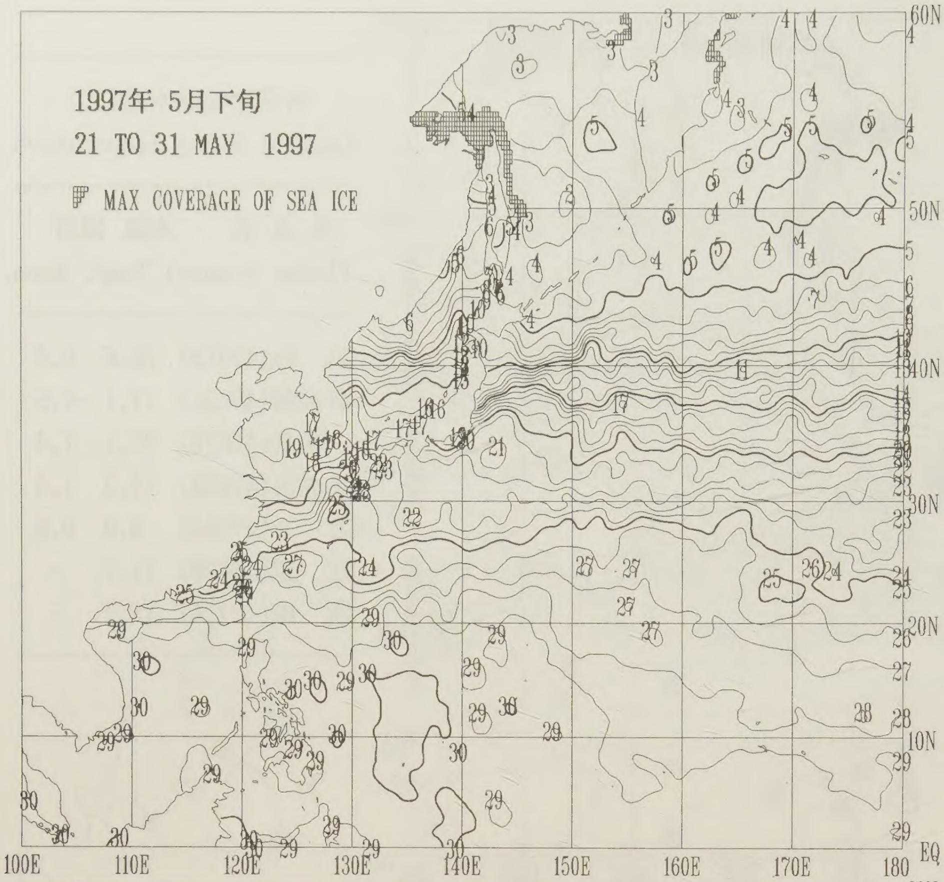


海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

日 本 海 37.9N,134.5E
14.5
四 国 沖 29.0N,135.0E
22.5
東シナ海 28.2N,126.3E
21.6

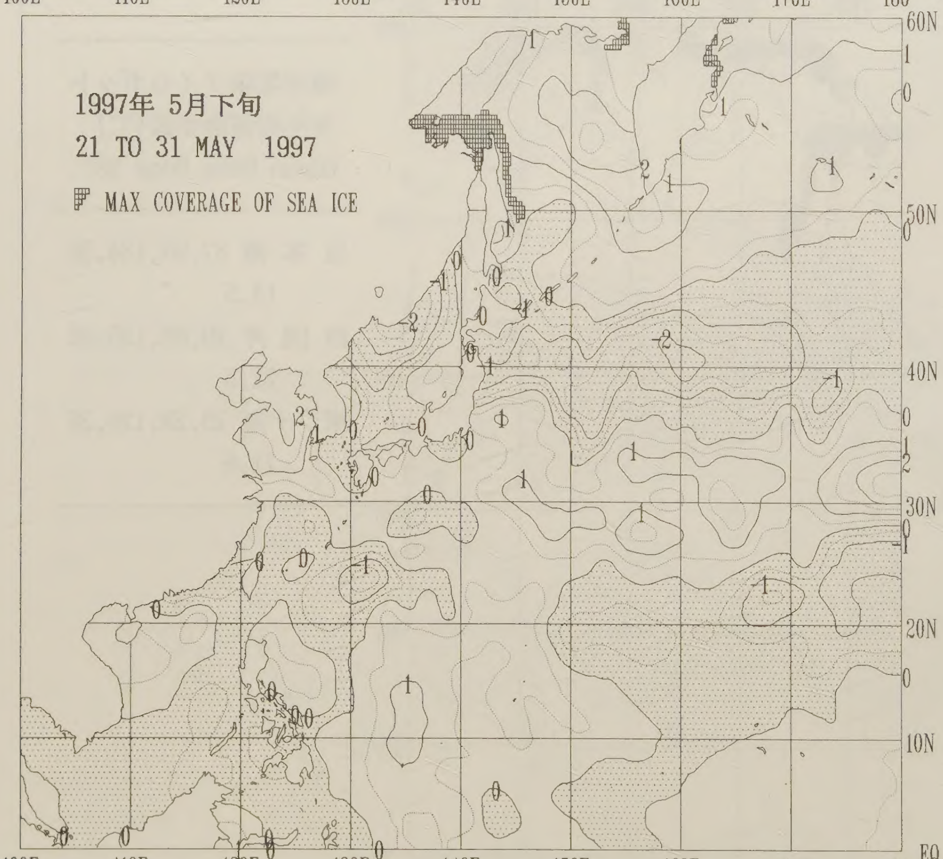
第2図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1997年 5月中旬)

Fig.2 Ten-day mean SSTs in the western North Pacific (top) and anomalies (bottom) for the 2nd ten-day period in MAY 1997. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown as broken lines. Negative anomalies are spotted.



旬平均沿岸水温(℃)
Coastal Water Temperature

地点名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	25.7	-0.8
御前崎(47655)	17.9	-1.7
八丈島(47678)	22.2	1.1
小名浜(47598)	14.1	0.7
宮　古(47585)	10.8	0.6
江　差(47428)	12.9	-
浜　田(47755)	19.2	-

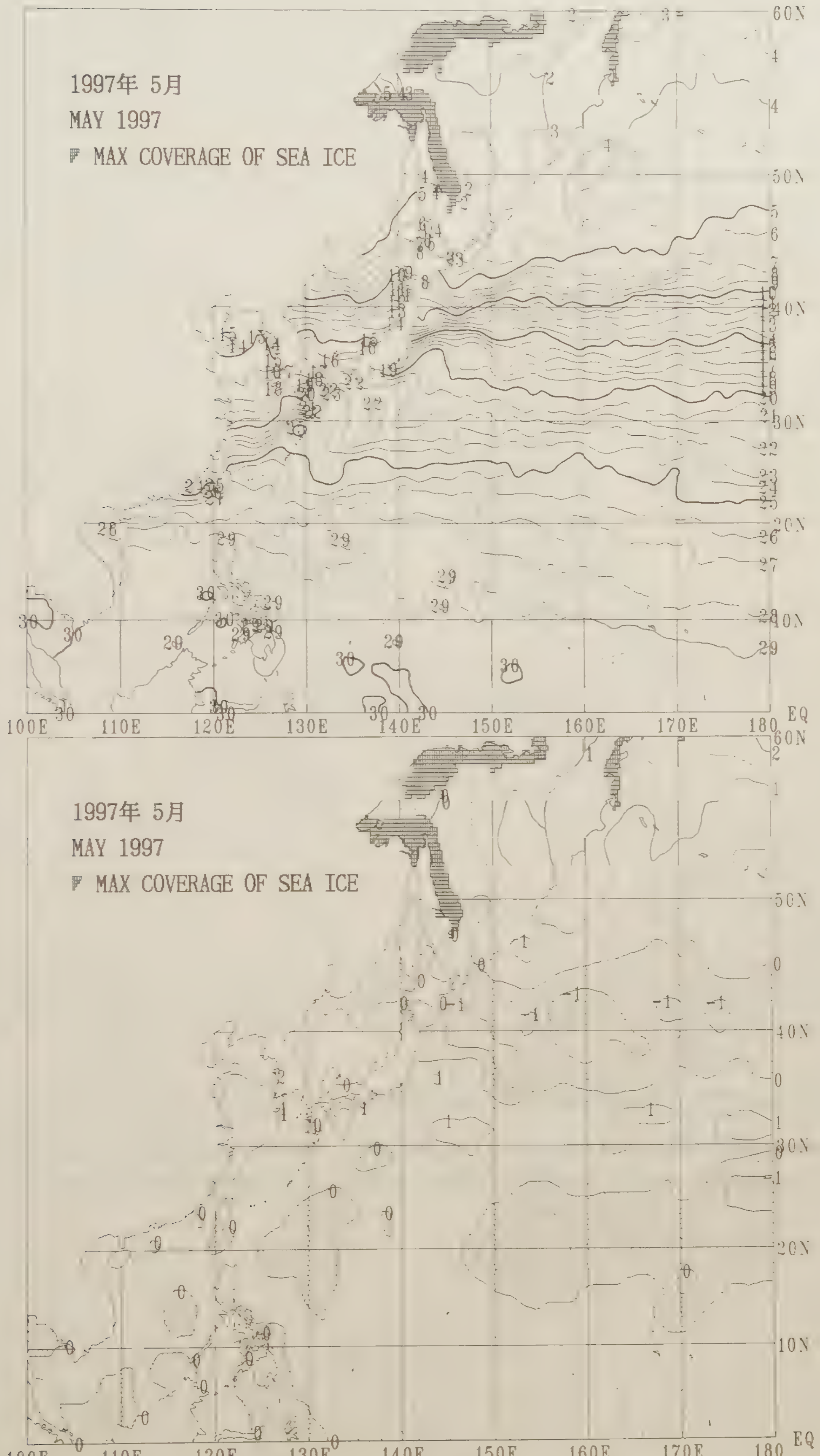


海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

日本海	37.9N,134.5E	15.7
四国沖	29.0N,135.0E	22.3
東シナ海	28.2N,126.3E	21.8

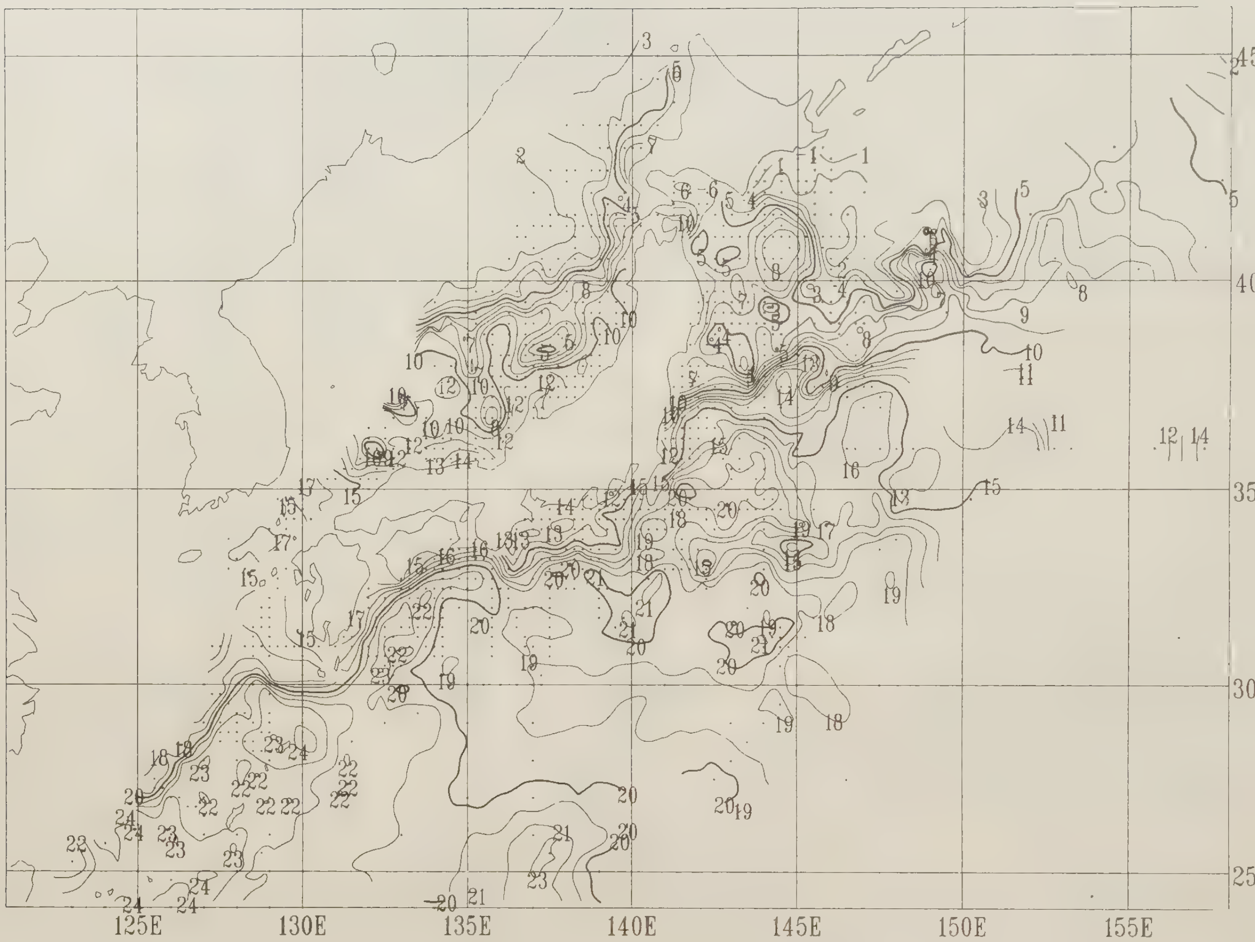
第3図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1997年 5月下旬)

Fig.3 Ten-day mean SSTs in the western North Pacific (top) and anomalies (bottom) for the 3rd ten-day period in MAY 1997. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown as broken lines. Negative anomalies are spotted.



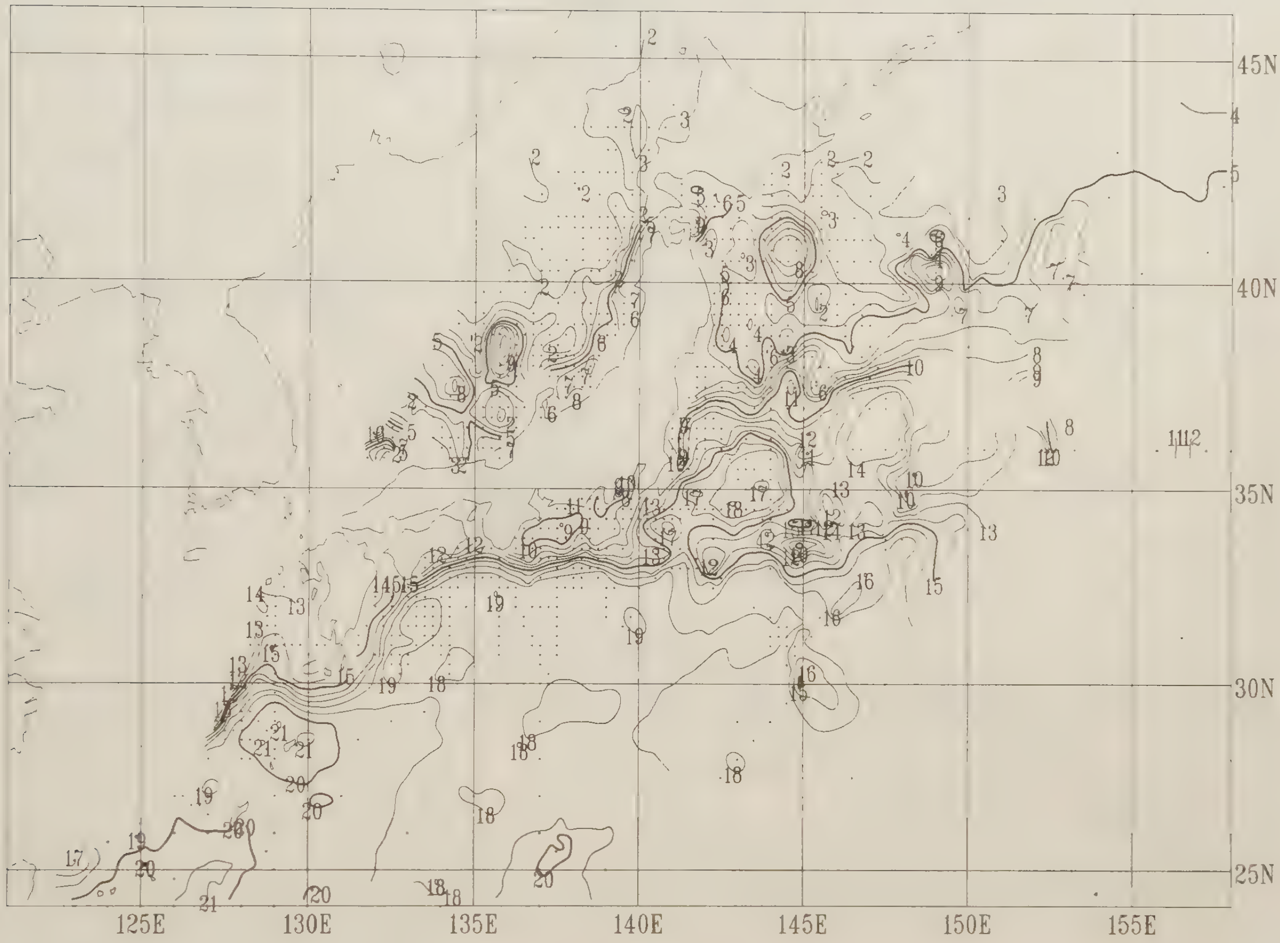
第4図 北西太平洋月平均海面水温図(上)及び偏差図(下)(1997年 5月)

Fig.4 Monthly mean SSTs in the western North Pacific (top) and anomalies (bottom) for MAY 1997. Anomalies are computed from the JMA climatology (1961-1990). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown as broken lines. Negative anomalies are spotted.



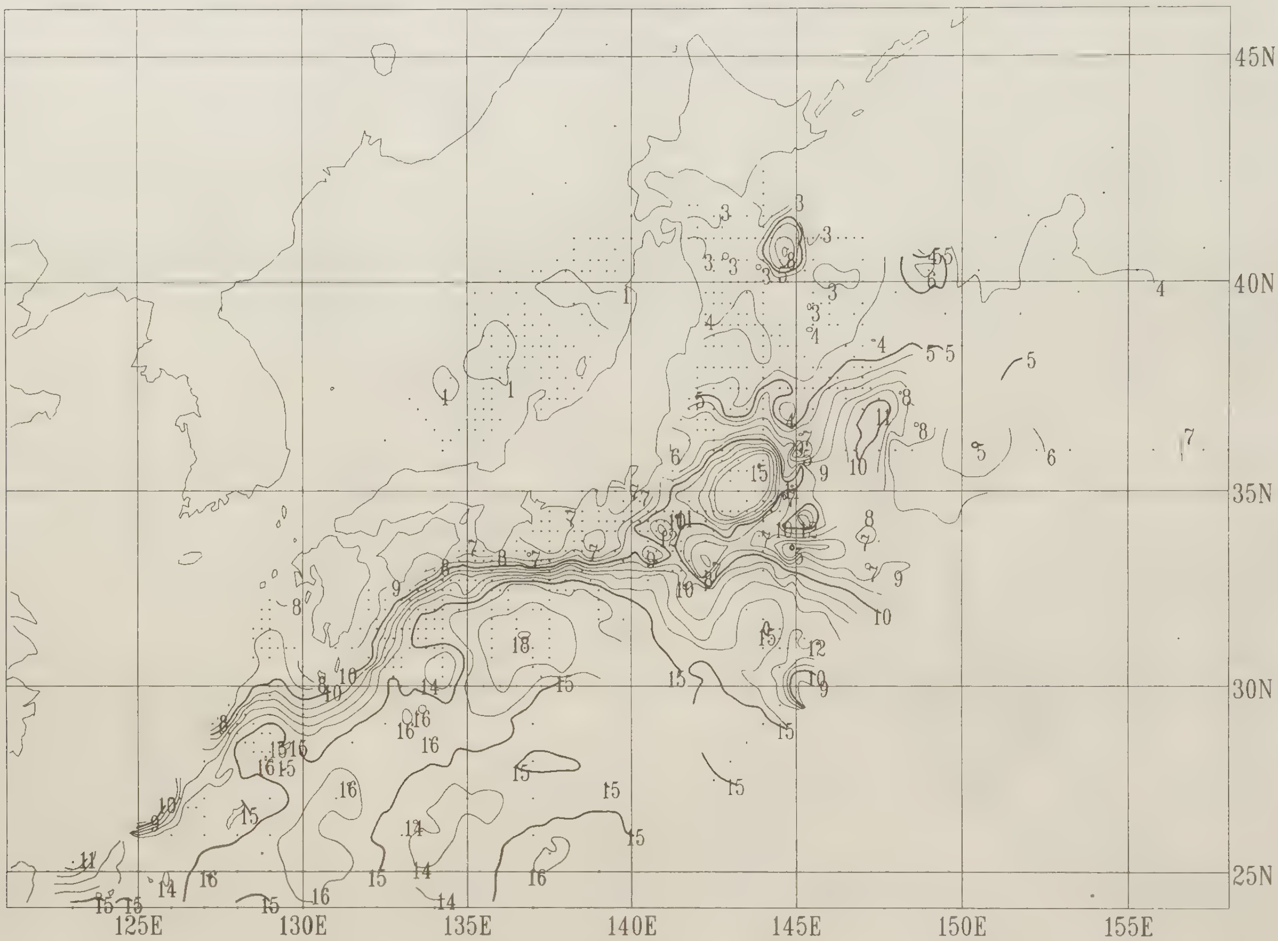
第5図　日本近海表層水温(深さ100m)図 (1997年 5月)

Fig.5 Subsurface (100m) temperatures in the seas adjacent to Japan for MAY 1997. Contour interval is 1°C. Observation points are denoted by dots.



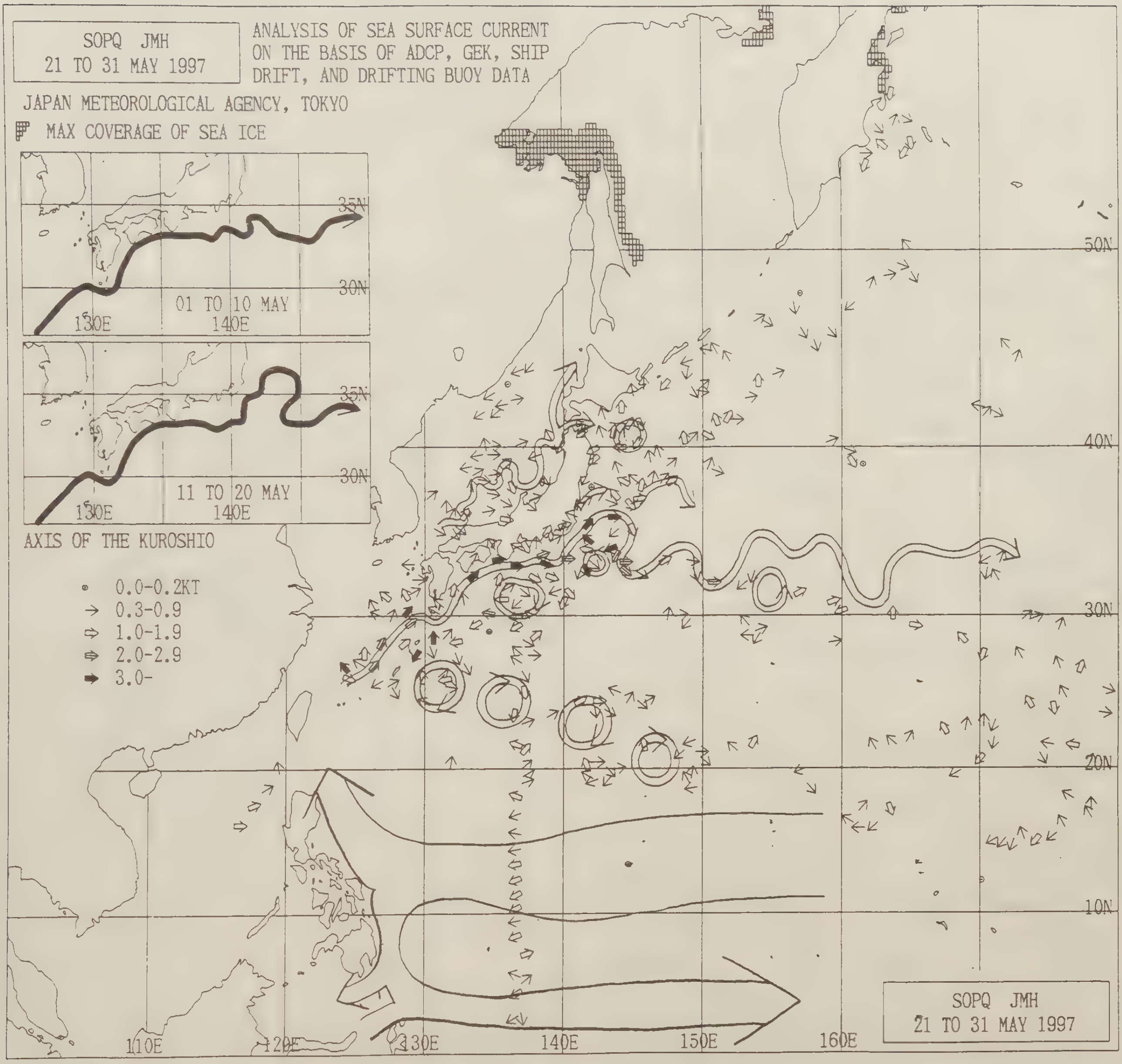
第6図　日本近海表層水温(深さ200m)図 (1997年 5月)

Fig.6 Subsurface (200m) temperatures in the seas adjacent to Japan for MAY 1997. Contour interval is 1°C. Observation points are denoted by dots.



第7図　日本近海表層水温(深さ400m)図 (1997年 5月)

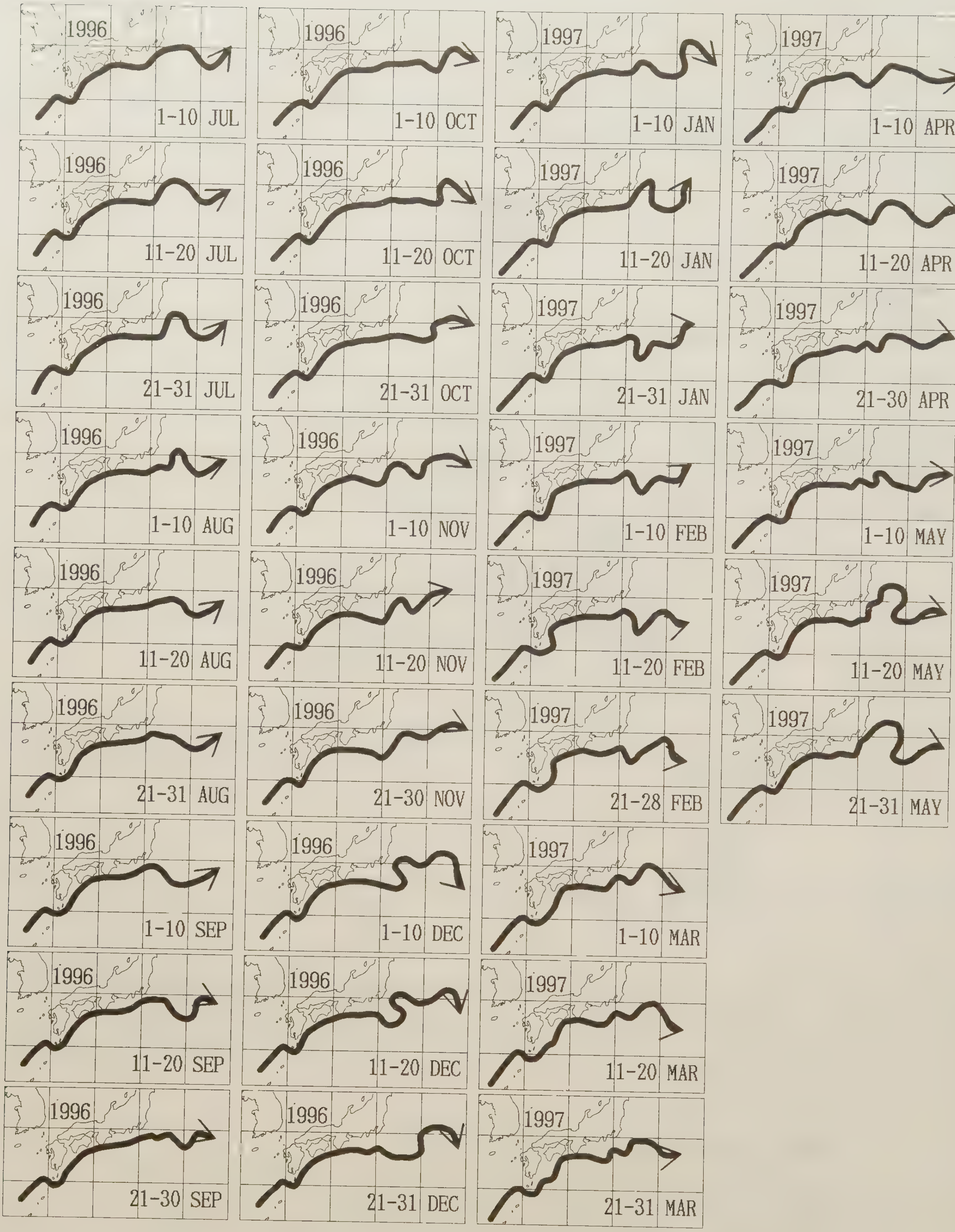
Fig.7 Subsurface (400m) temperatures in the seas adjacent to Japan for MAY 1997. Contour interval is 1°C. Observation points are denoted by dots.



第8図　北西太平洋海流図（1997年 5月下旬）

Fig.8 Analysis of the sea surface current in the western North Pacific for the 3rd ten-day period in MAY 1997. Small arrows indicate sea surface currents measured with acoustic Doppler current profilers, GEKs deployed in research vessels, and ship drift by merchant ships/drifting buoys during the month. Major currents such as the Kuroshio and the North Equatorial Current are denoted by larger open arrows.

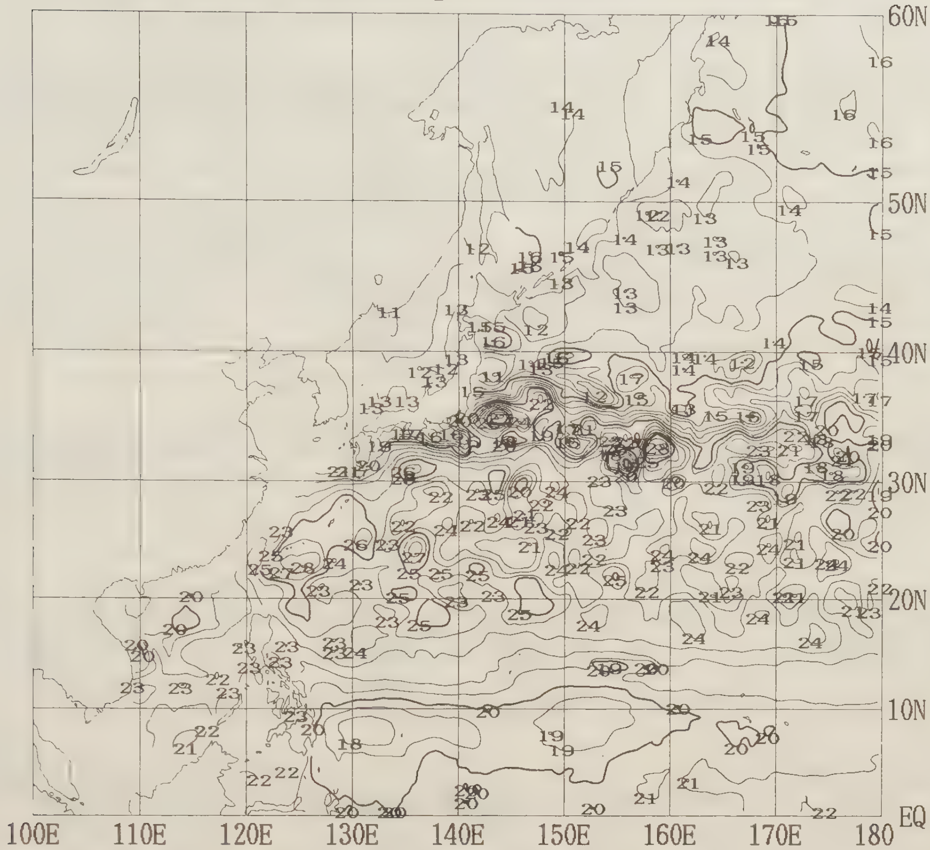
Time series of the Kuroshio axis



第9図 旬別黒潮流軸図

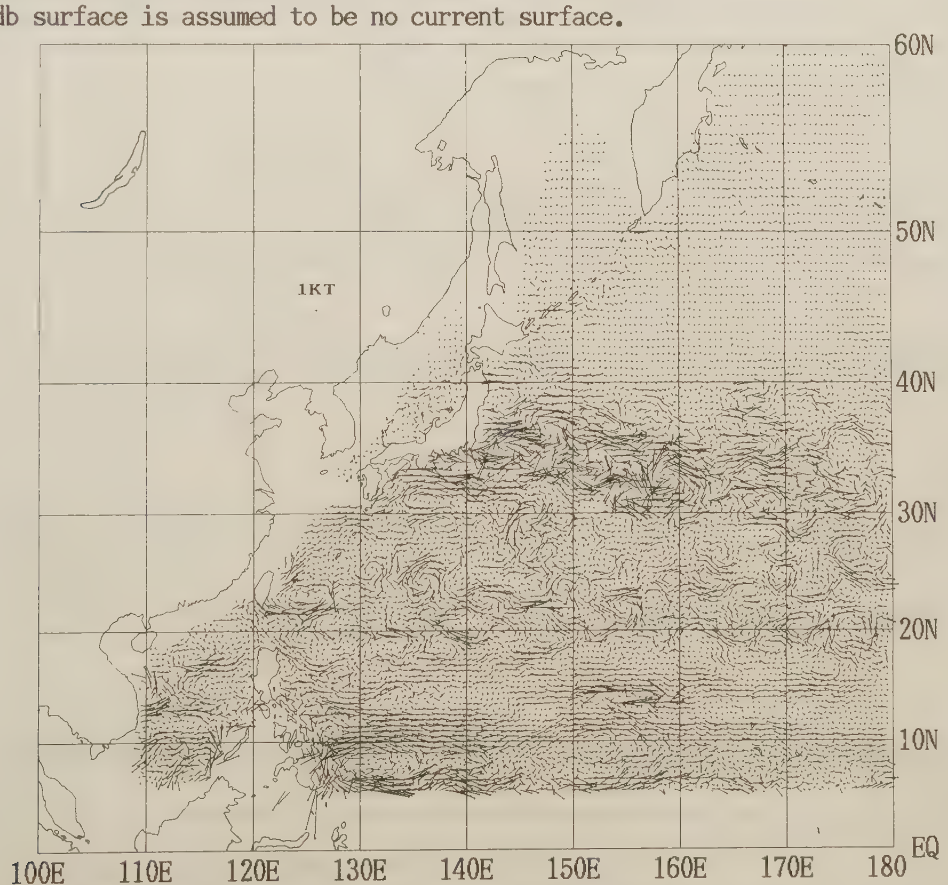
Fig.9 Time series of the Kuroshio axis

Sea surface dynamic heights and current distribution



第10図 北西太平洋海面力学高度分布図(1997年 5月13日)

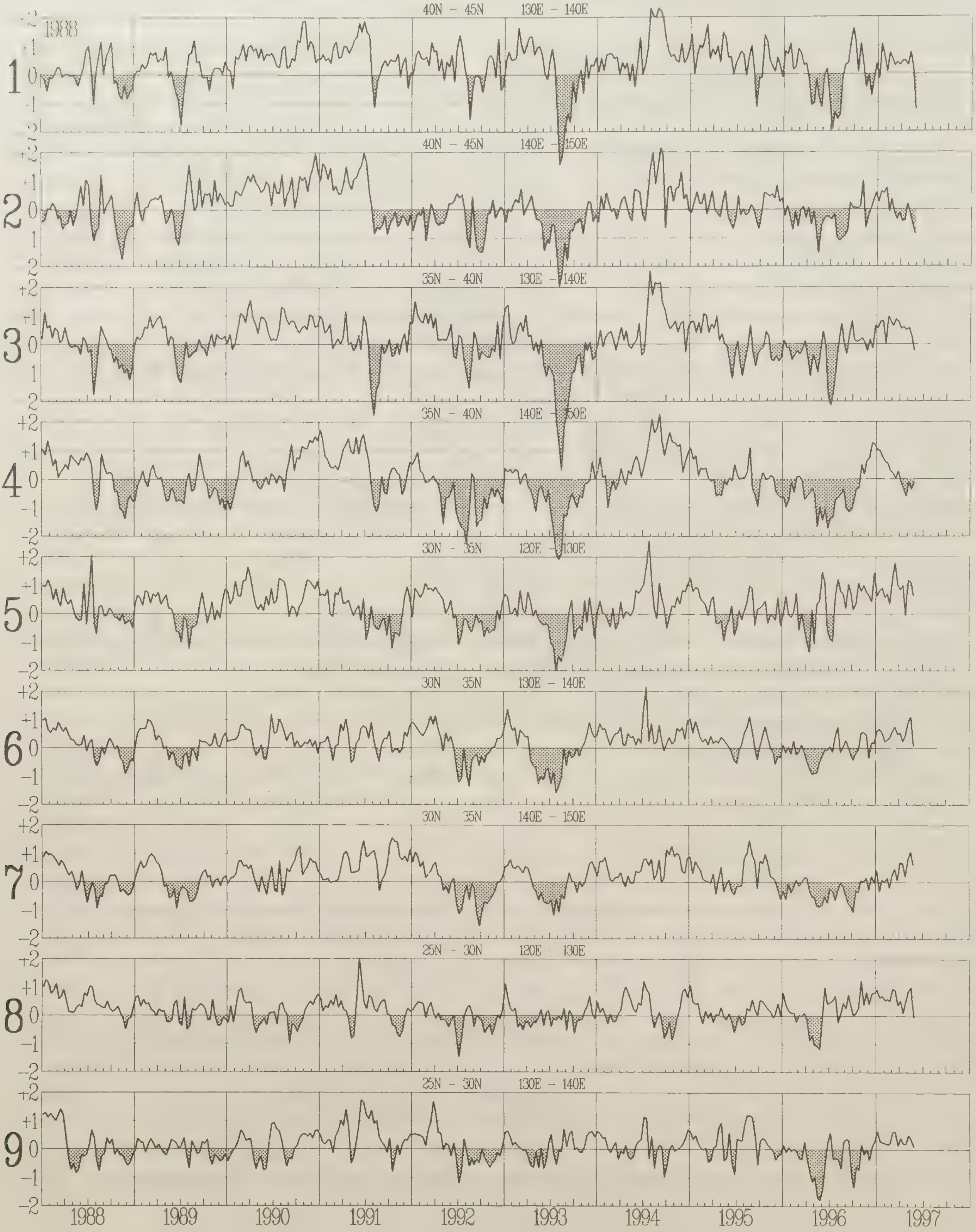
Fig.10 Sea surface dynamic heights (10cm) in the western North Pacific derived from the altimeter data of TOPEX/POSEIDON (MAY 13,1997).
1500db surface is assumed to be no current surface.



第11図 北西太平洋海流ベクトル図(1997年 5月13日)

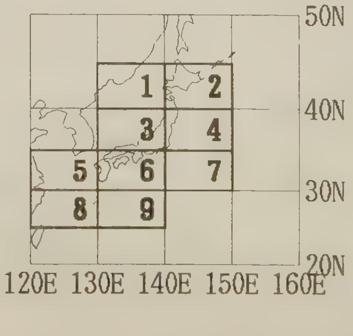
Fig.11 Sea surface current vectors in the western North Pacific (MAY 13,1997).
Vectors are derived from the sea surface dynamic heights from TOPEX/POSEIDON and sub-surface temperature distribution assuming the geostrophic relation.

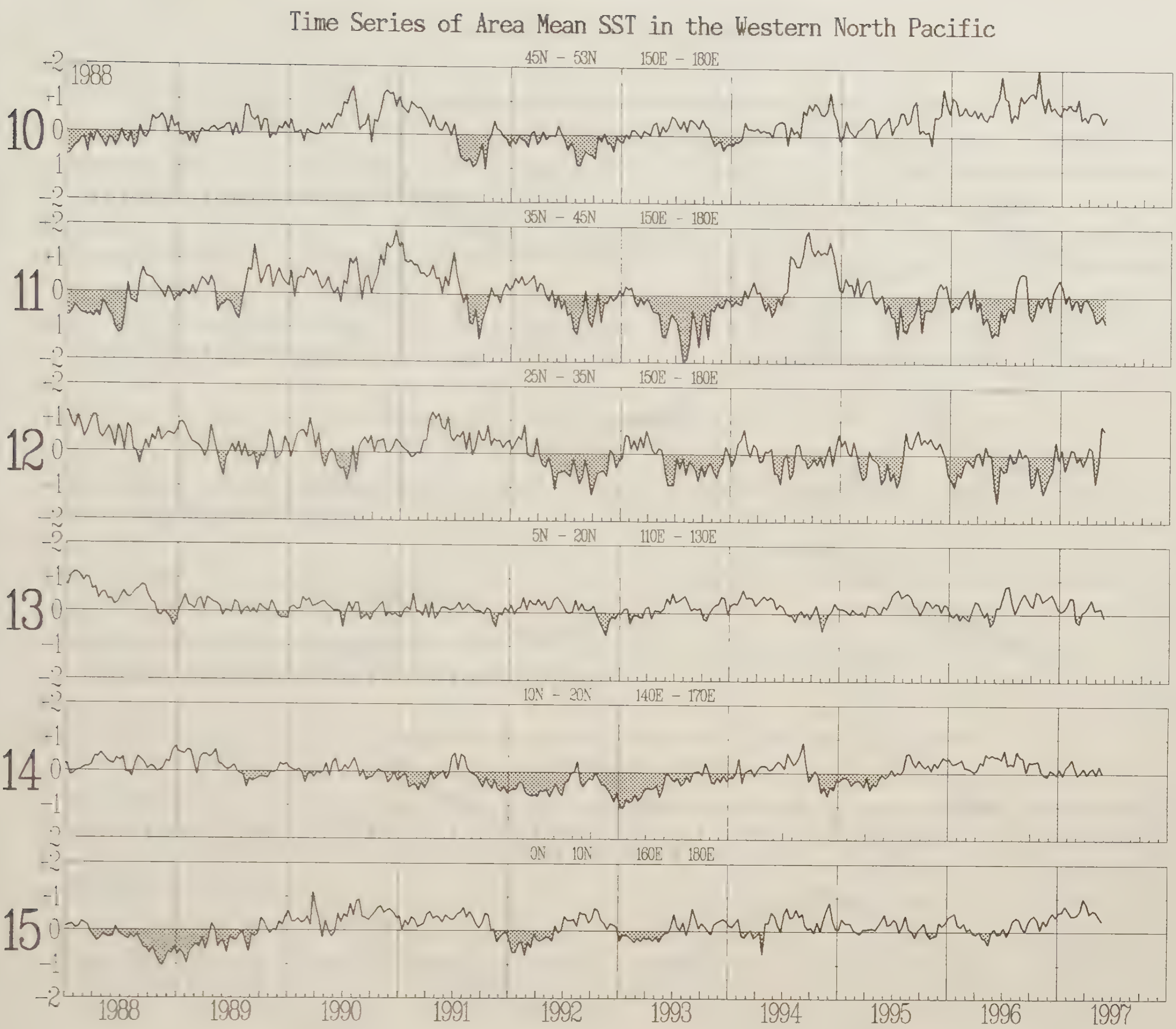
Time Series of Area Mean SST in the Western North Pacific

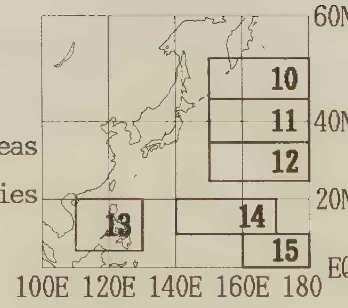


第12図　海域別旬平均海面水温平年偏差時系列図

Fig.12 Time series of the ten-day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas shown in the right figure. Negative anomalies are shaded. Anomalies are computed from the JMA climatology (1961-90).

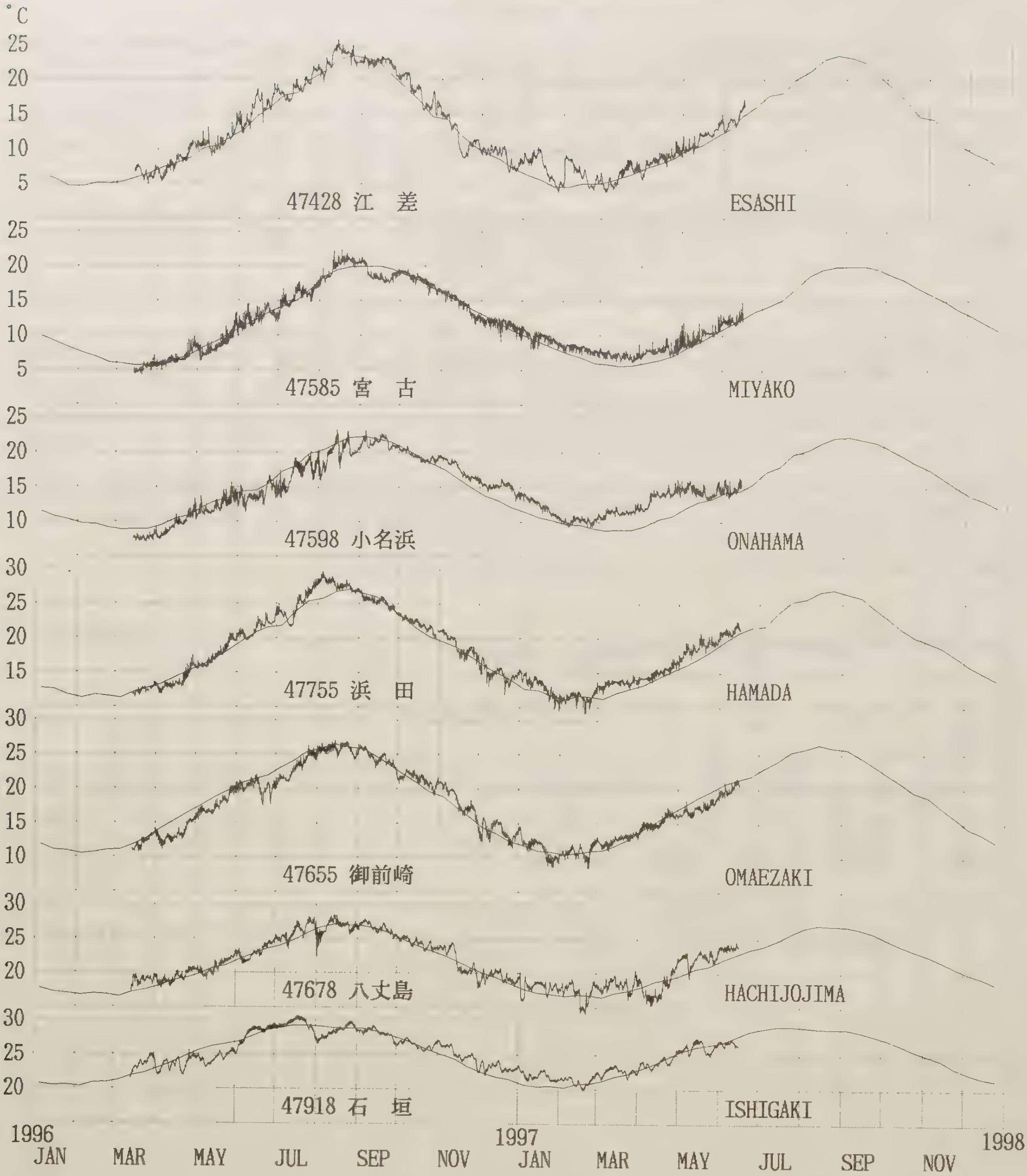


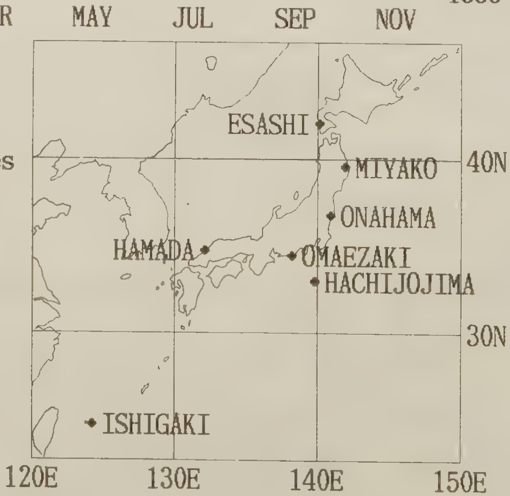




第12図　海域別旬平均海面水温平年偏差時系列図（つづき）

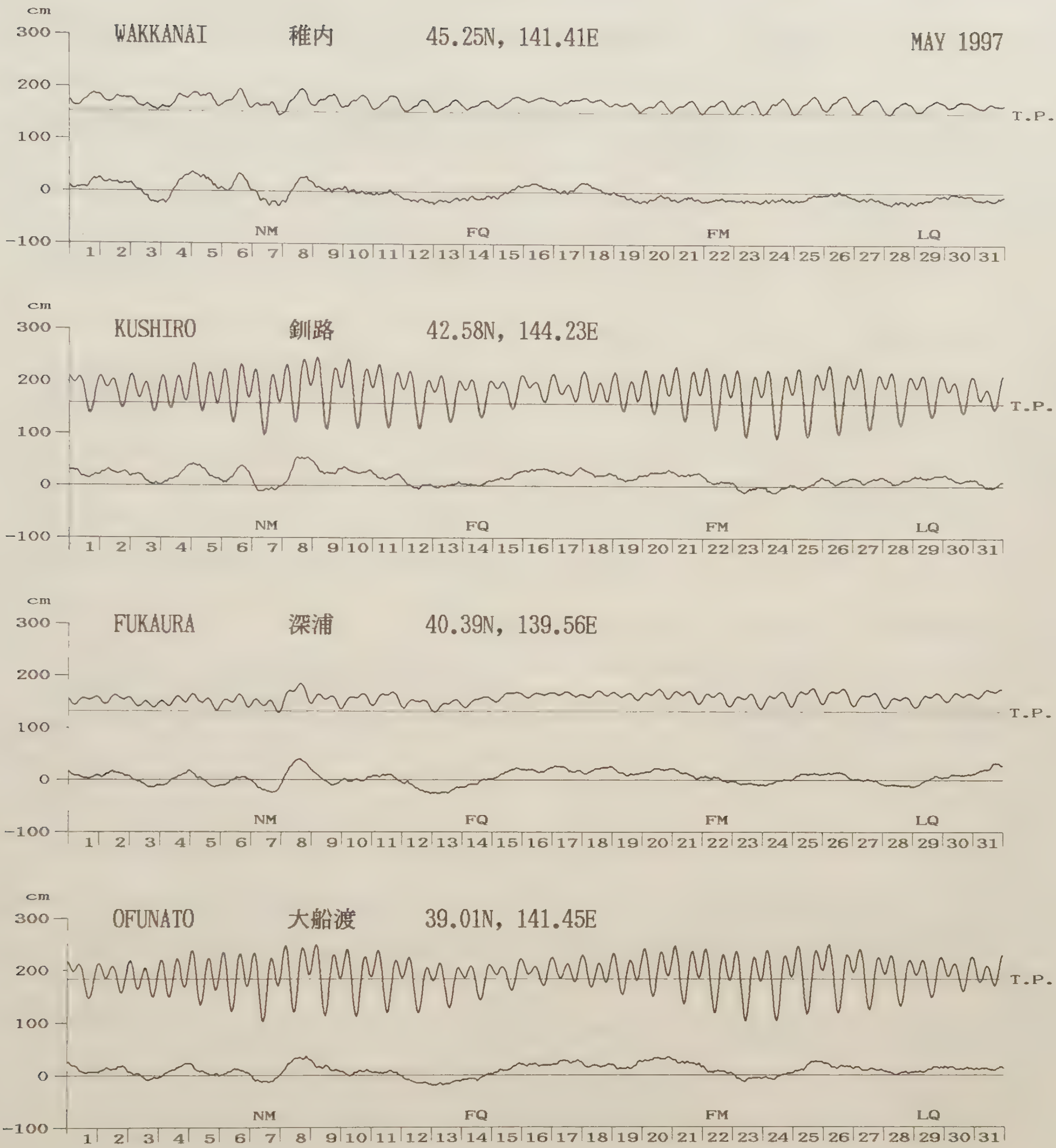
Fig.12 (continue) Time series of the ten-day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas shown in the right figure. Negative anomalies are shaded. Anomalies are computed from the JMA climatology (1961-90).

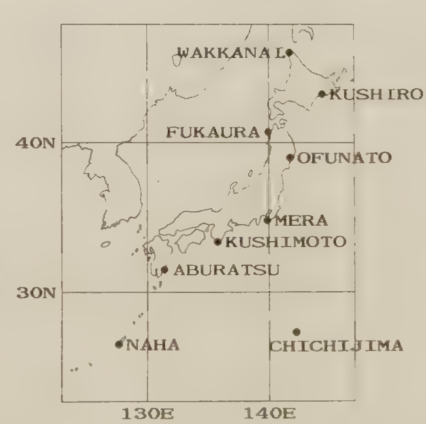




第13図 沿岸水温時系列図

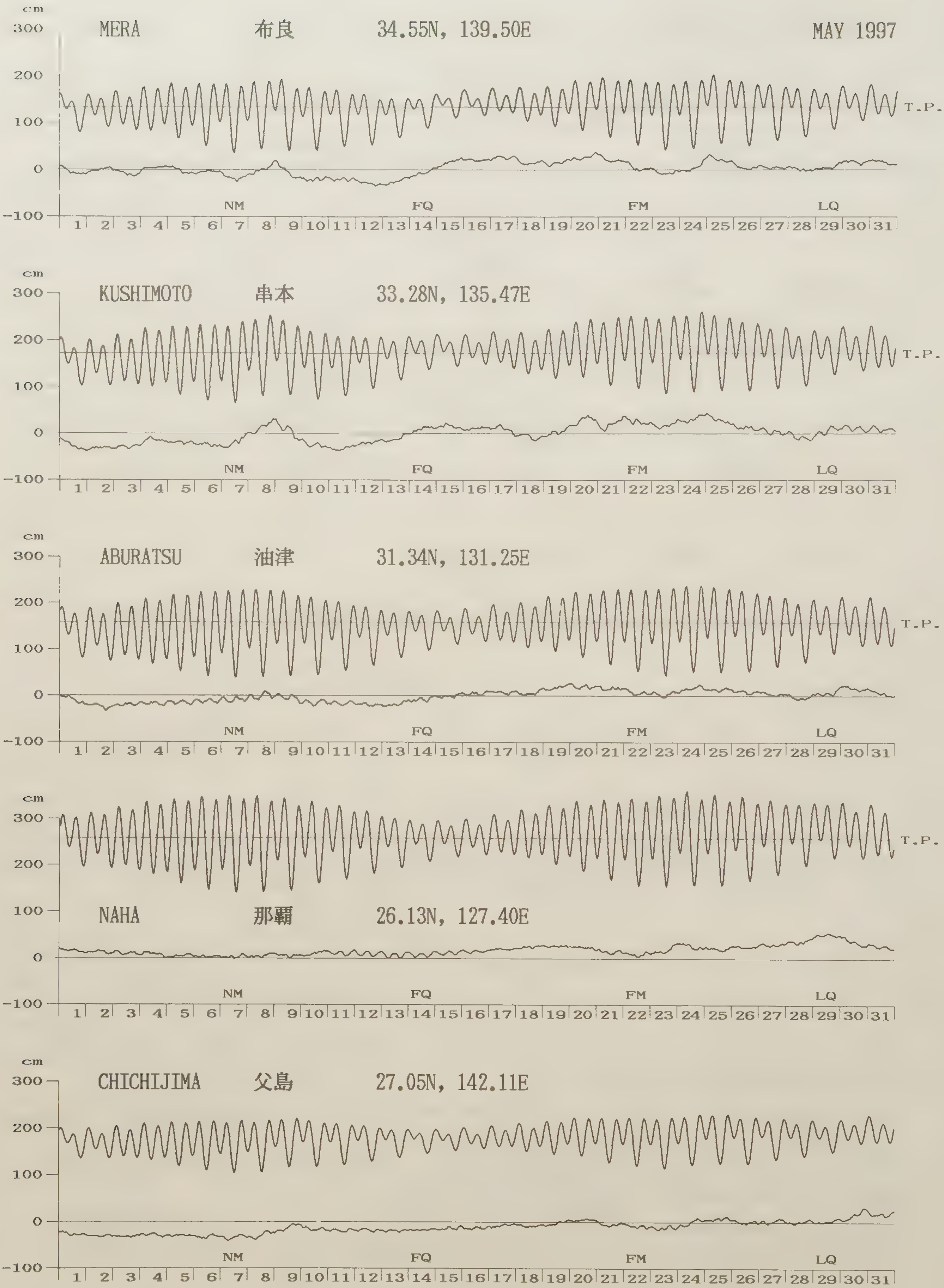
Fig.13 Time series of hourly coastal water temperatures (°C) measured at 7 coastal stations of the JMA shown in the right panel.
Thin lines show 10-day mean climatology.





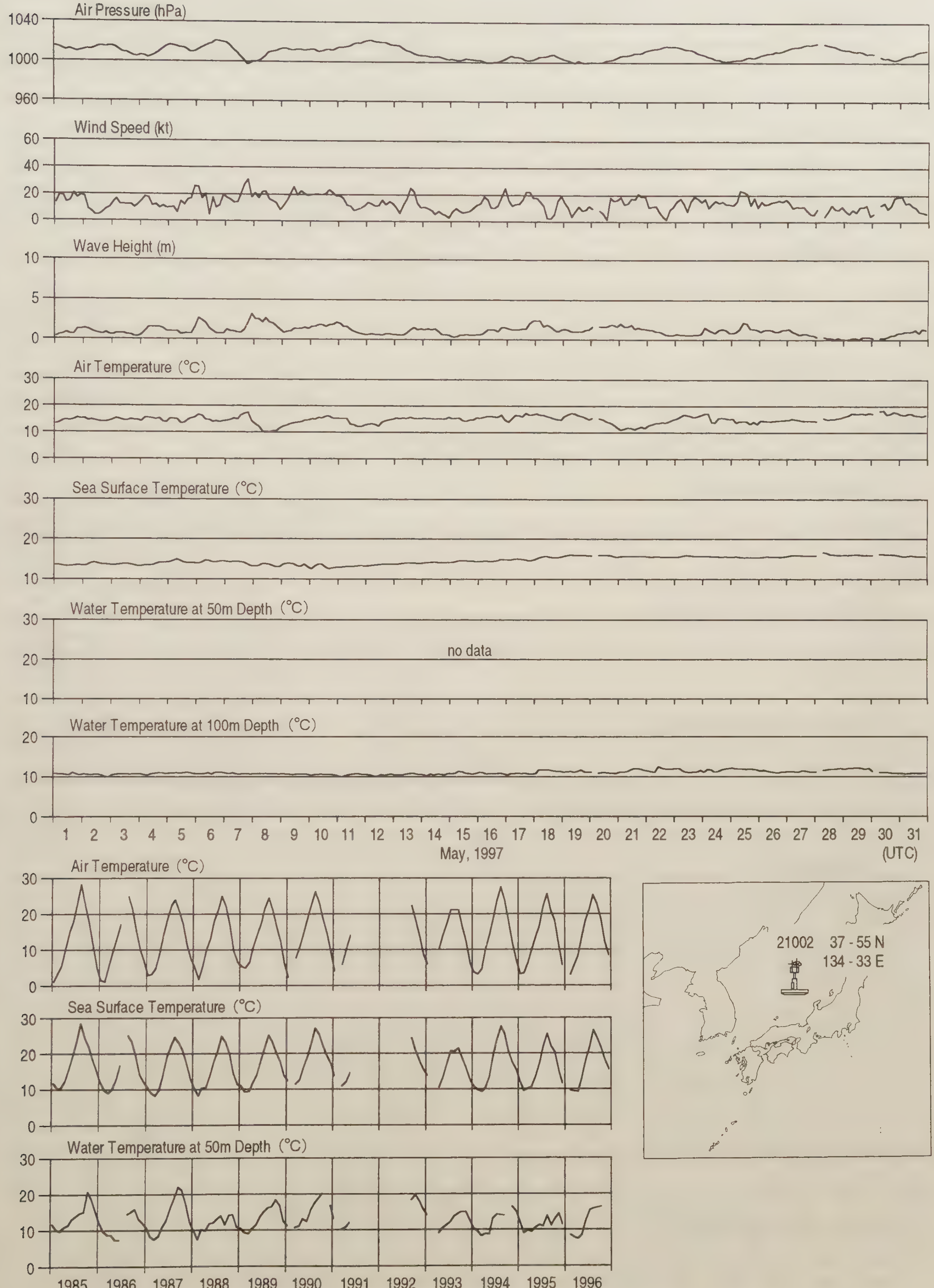
第14図 沿岸潮位時系列図（1997年 5月）

Fig.14 Time series of hourly sea level observation (upper line) and its anomalies (lower line) at 9 stations of the JMA in the right panel.
Short term variations are removed from raw data.
Sea level anomalies are two times values of the differences between the observations and the predicted astronominal tide.
FM: full moon, FQ: first quarter
NM: new moon, LQ: last quarter
T.P.: Mean sea level of Tokyo Bay (Tokyo Peil)



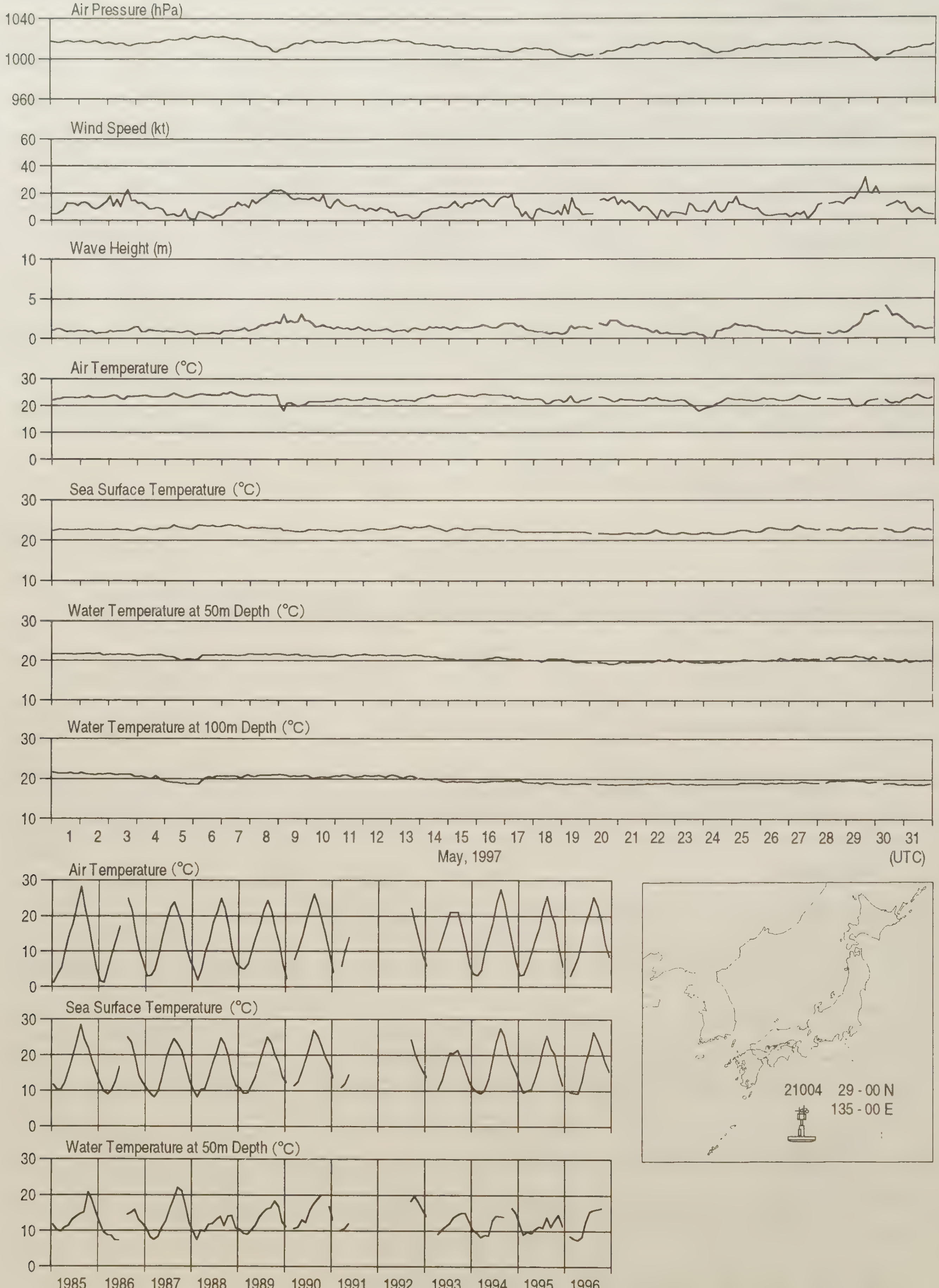
第14図 つづき
Fig.14 continue

Ocean Data Buoy Observations



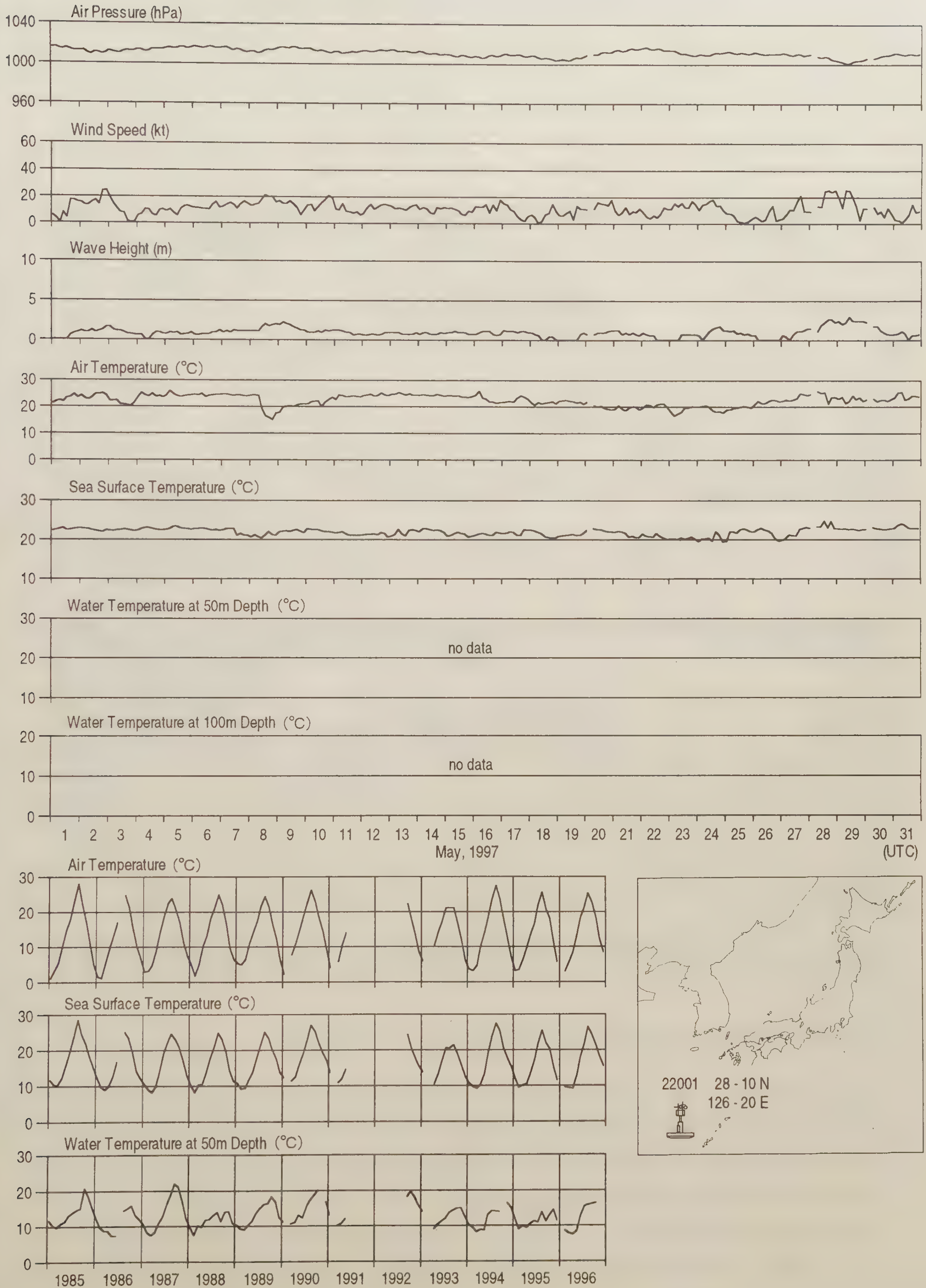
第15図　海洋気象ブイロボットによる観測の時系列図（日本海：21002）
上段は３時間毎の観測値を、下段は月平均値を示す。

Fig. 15　Time series of JMA buoy observation in the Japan Sea (WMO ID No. 21002).
The upper panel shows three hourly observation and the lower panel shows the monthly mean data.



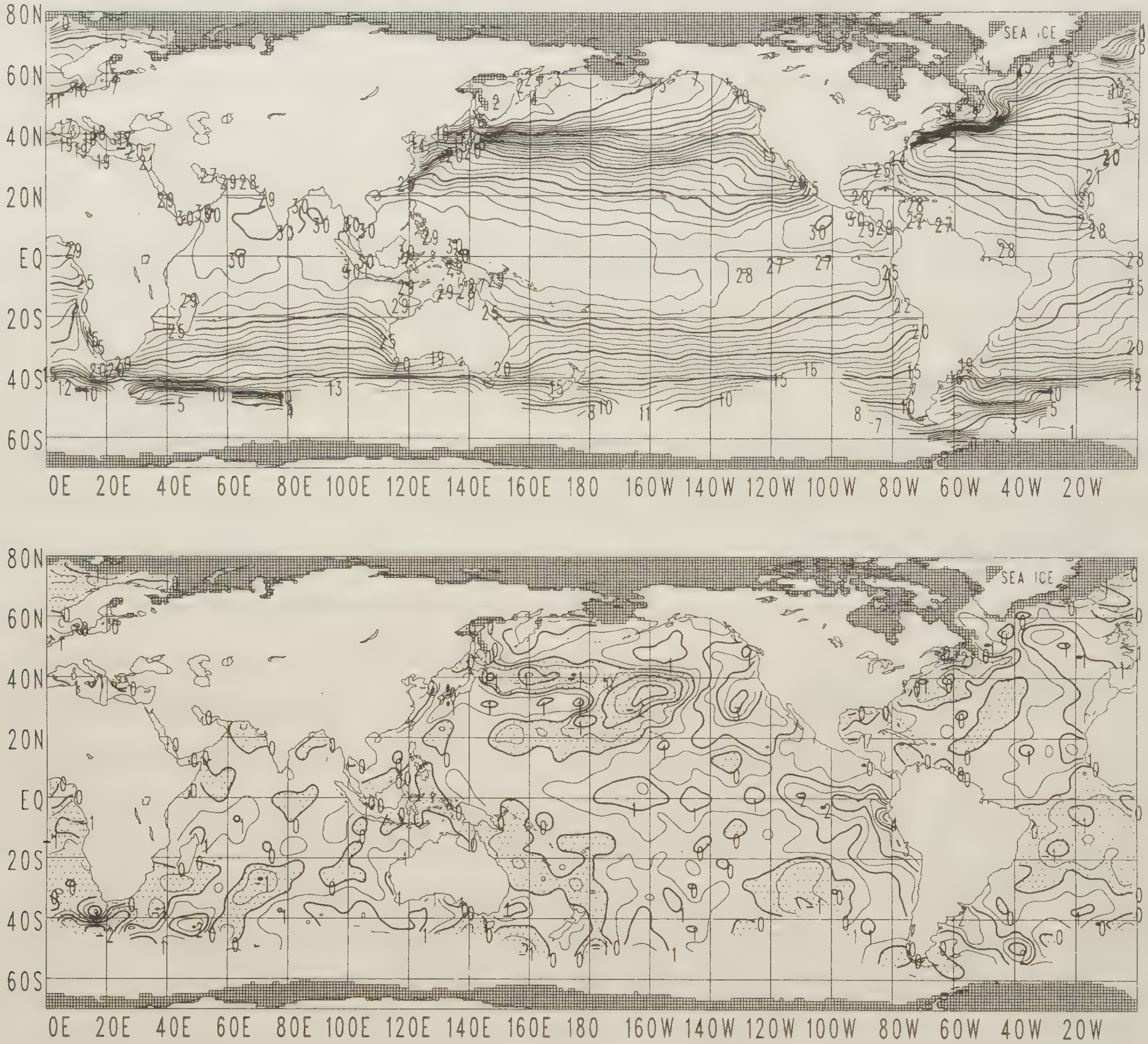
第15図　海洋気象ブイロボットによる観測の時系列図（四国沖：21004）
上段は３時間毎の観測値を、下段は月平均値を示す。

Fig.15　Time series of JMA buoy observation south of Shikoku (WMO ID No. 21004).
The upper panel shows three hourly observation and the lower panel shows the monthly mean data.



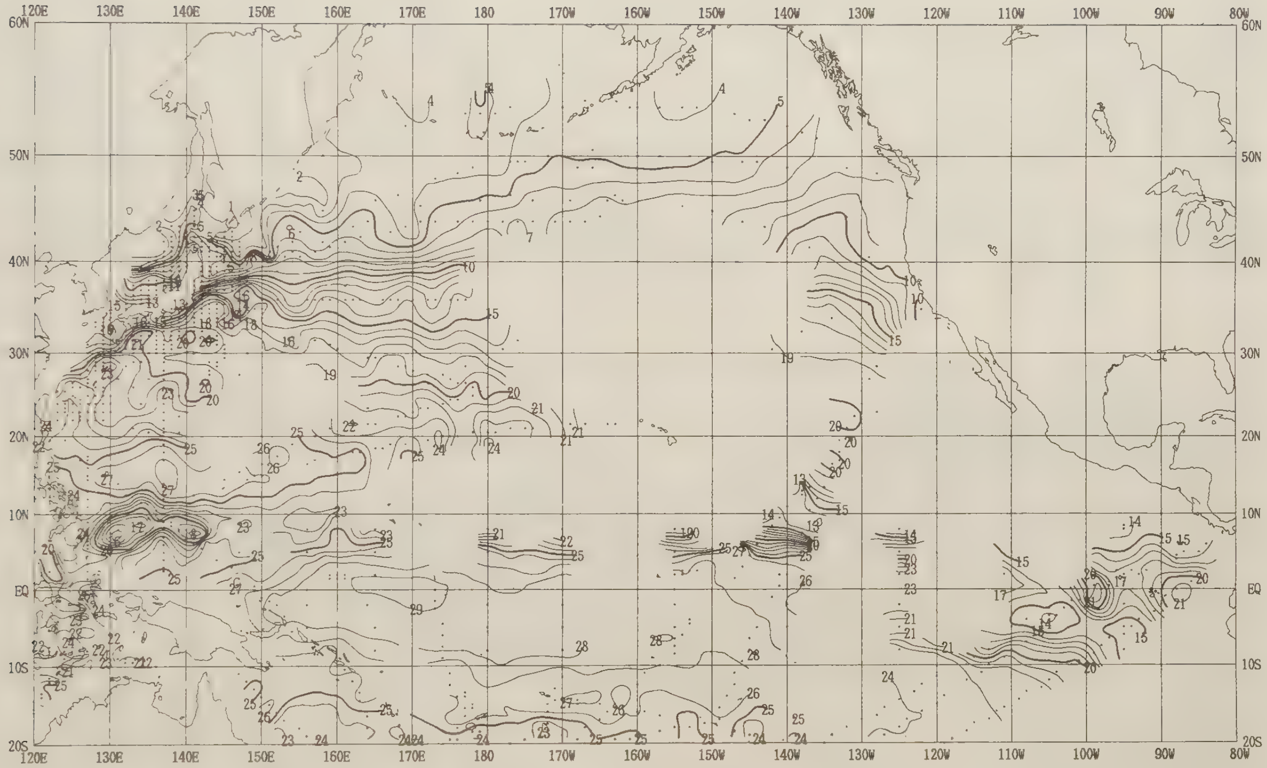
第15図　海洋気象ブイロボットによる観測の時系列図（東シナ海：22001）
上段は３時間毎の観測値を、下段は月平均値を示す。

Fig. 15　Time series of JMA buoy observation in the East China Sea (WMO ID No. 22001). The upper panel shows three hourly observation and the lower panel shows the monthly mean data.



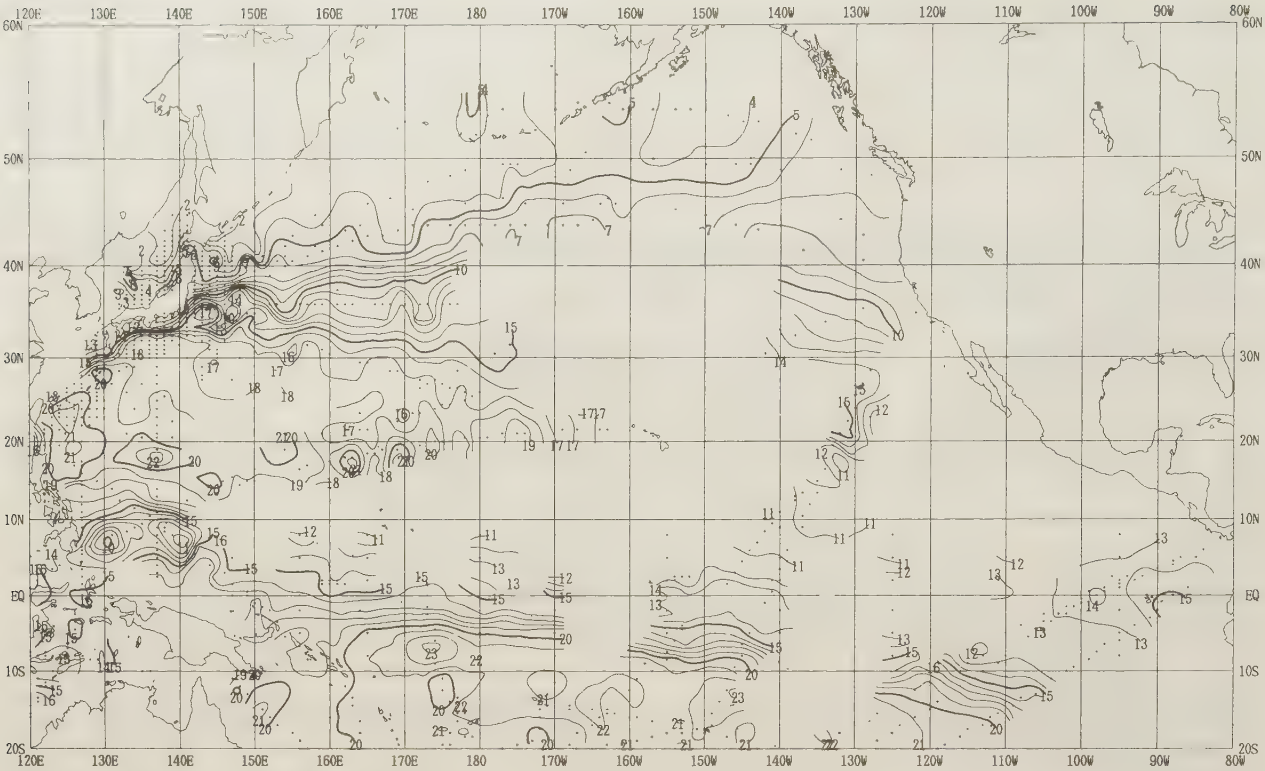
第16図　全球月平均海面水温図（上）及び偏差図（下）（1997年 5月）

Fig.16 Monthly mean sea surface temperature over the global ocean (top) and anomalies (bottom) for MAY 1997. Anomalies are computed from the JMA climatology (1961-1990) (Marine Department of JMA, 1991, Climatic charts of sea surface temperatures of the western North Pacific and the global ocean). Contour interval is 1°C (top) and additional anomaly contours of ±0.5°C are shown as thin lines. Negative anomalies are spotted. Maximum coverage of sea ice is shaded. Data sources for sea ice are U.S. National Ice Center (polar regions) and JMA (the Sea of Okhotsk).



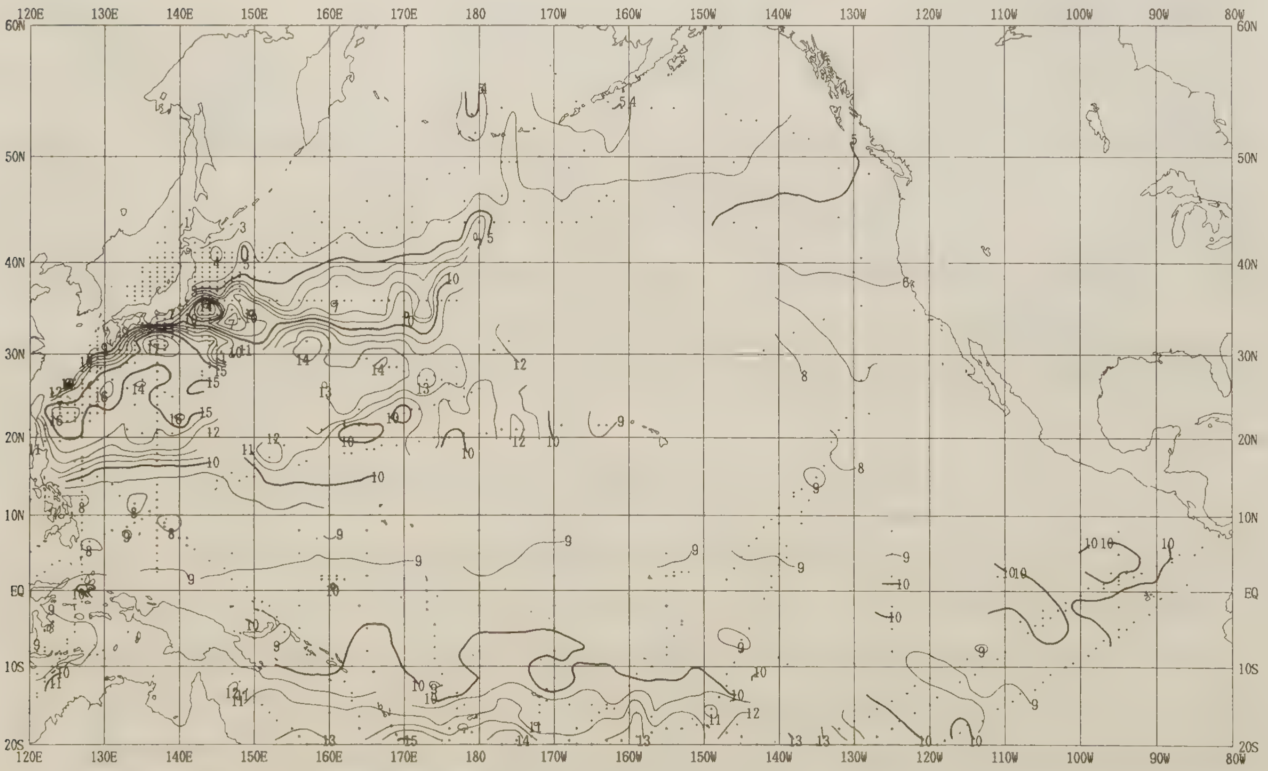
第17図　太平洋表層水温(深さ100m)図 (1997年 5月)

Fig.17 Subsurface (100m) temperatures in the Pacific Ocean for MAY 1997. Contour interval is 1°C. Observation points are denoted by dots.



第18図　太平洋表層水温(深さ200m)図 (1997年 5月)

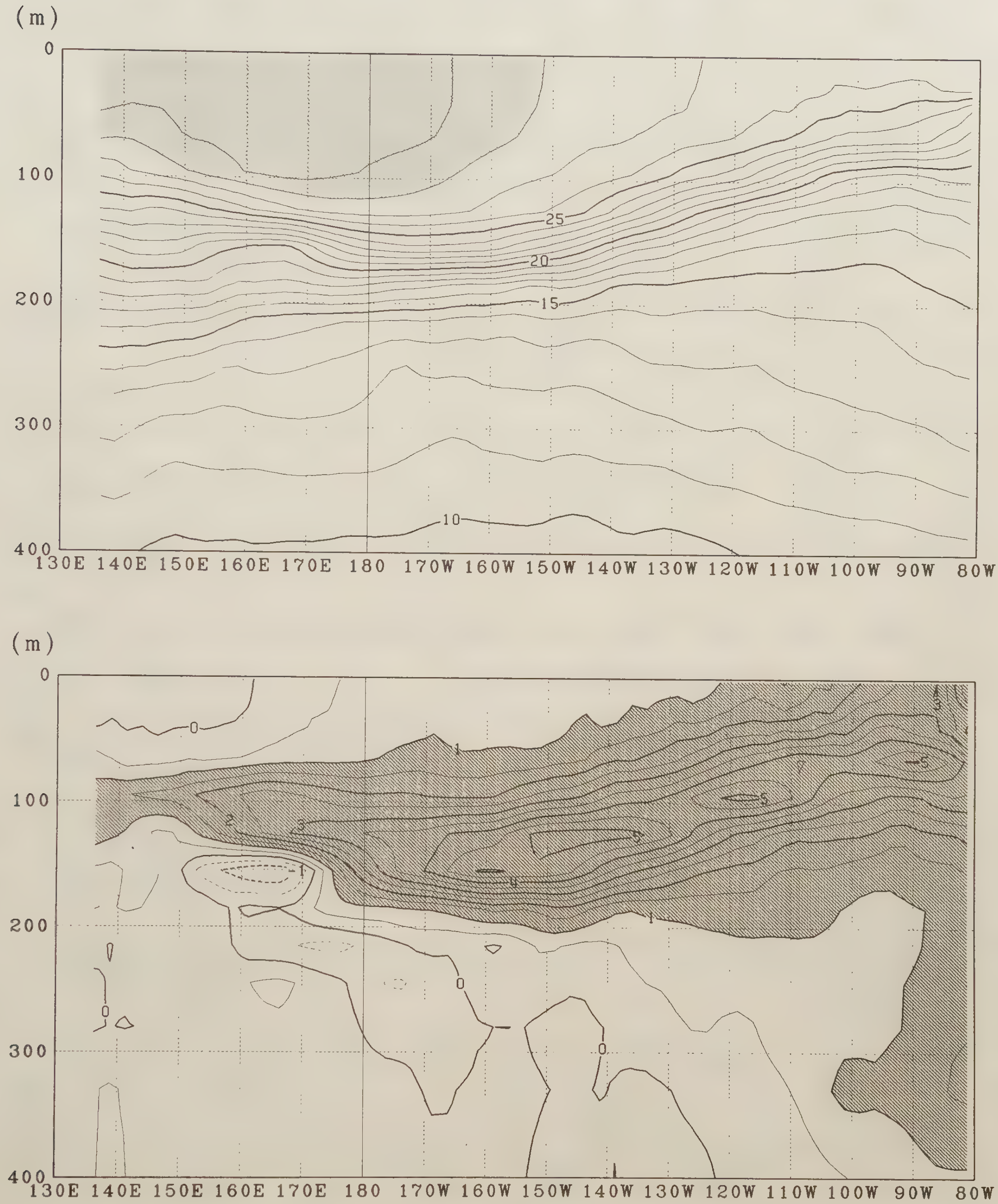
Fig.18 Subsurface (200m) temperatures in the Pacific Ocean for MAY 1997. Contour interval is 1°C. Observation points are denoted by dots.



第19図　太平洋表層水温(深さ400m)図 (1997年 5月)

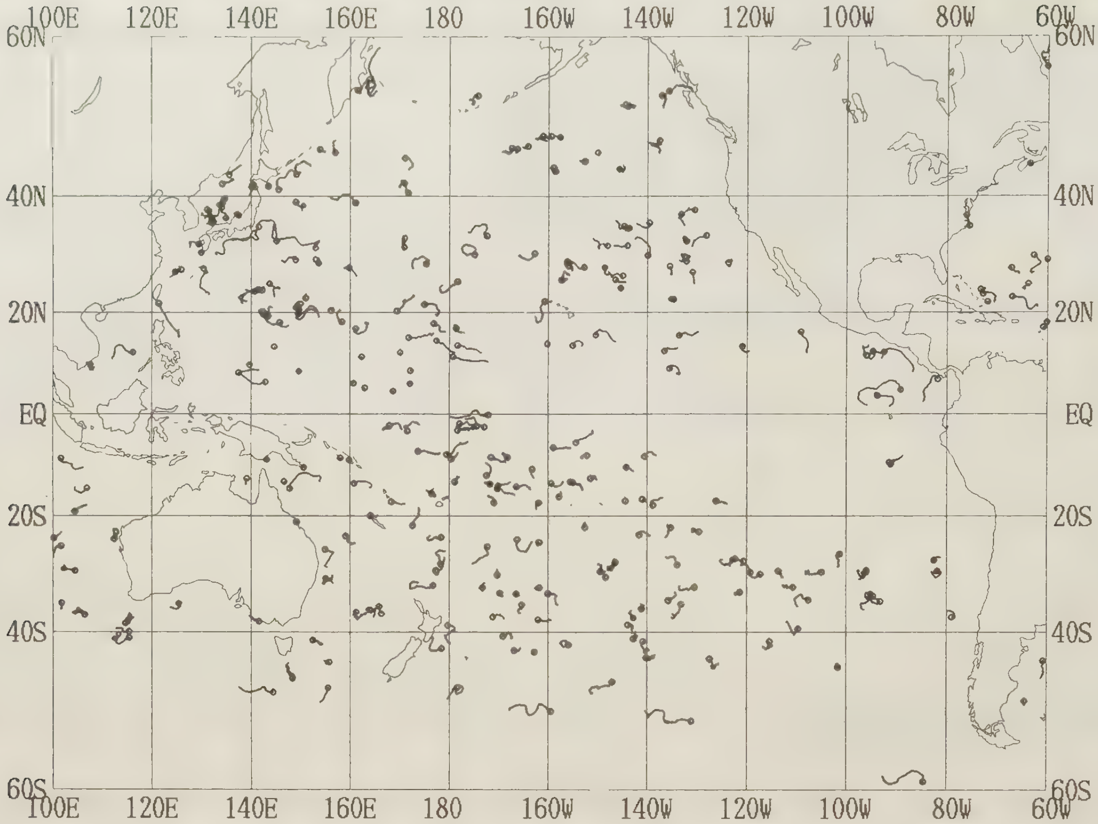
Fig.19 Subsurface (400m) temperatures in the Pacific Ocean for MAY 1997. Contour interval is 1°C. Observation points are denoted by dots.

Depth-Longitude Sections of Equatorial Temperature & Anomalies



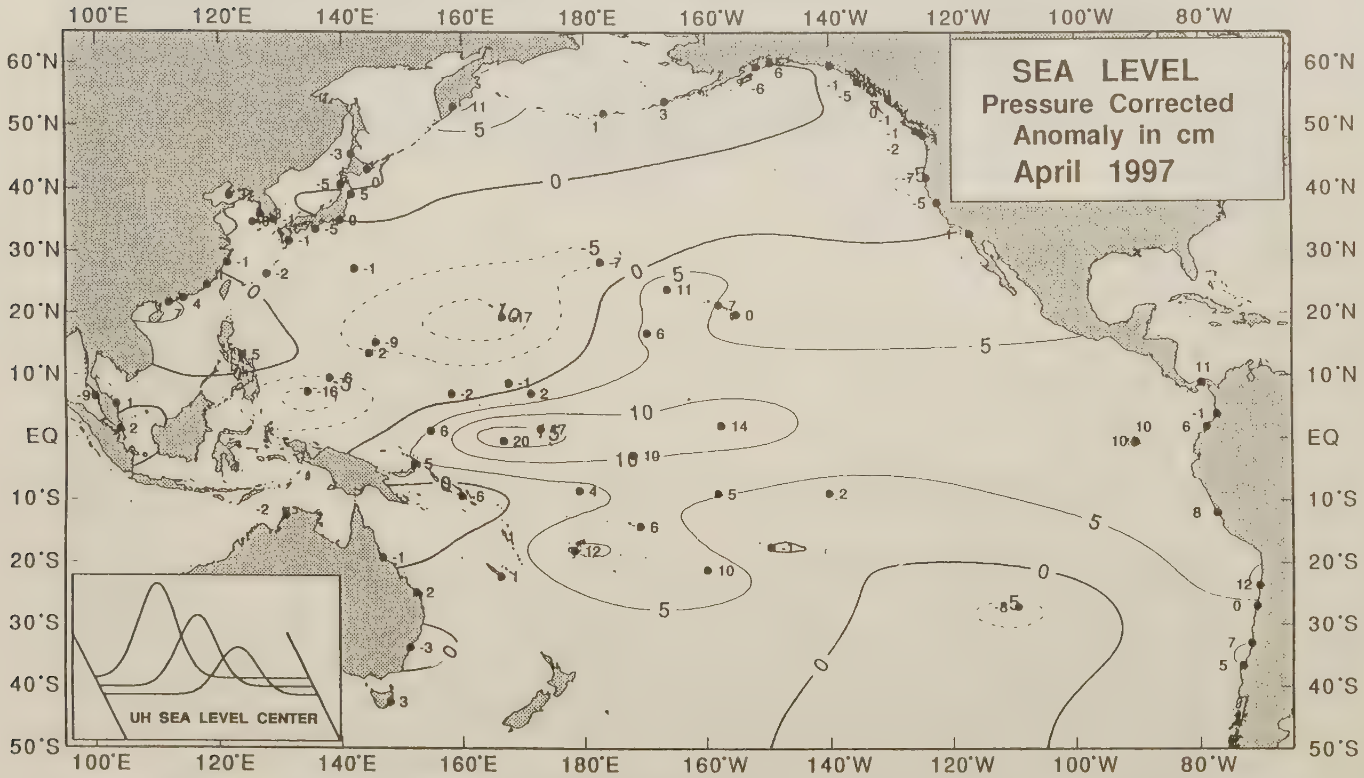
第20図　太平洋赤道に沿う表層水温（上）及び偏差（下）の深度－経度断面図（1997年 5月）

Fig.20 Depth-longitude sections of temperature (top) and anomalies (bottom) along the equator in the Pacific Ocean for MAY 1997. Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C (top) and 0.5°C (bottom). Values greater than 28°C in top panel are shaded. In bottom panel values greater than 1°C are shaded and values less than -1°C are spotted. Anomalies are computed from 1987-1995 base period means.



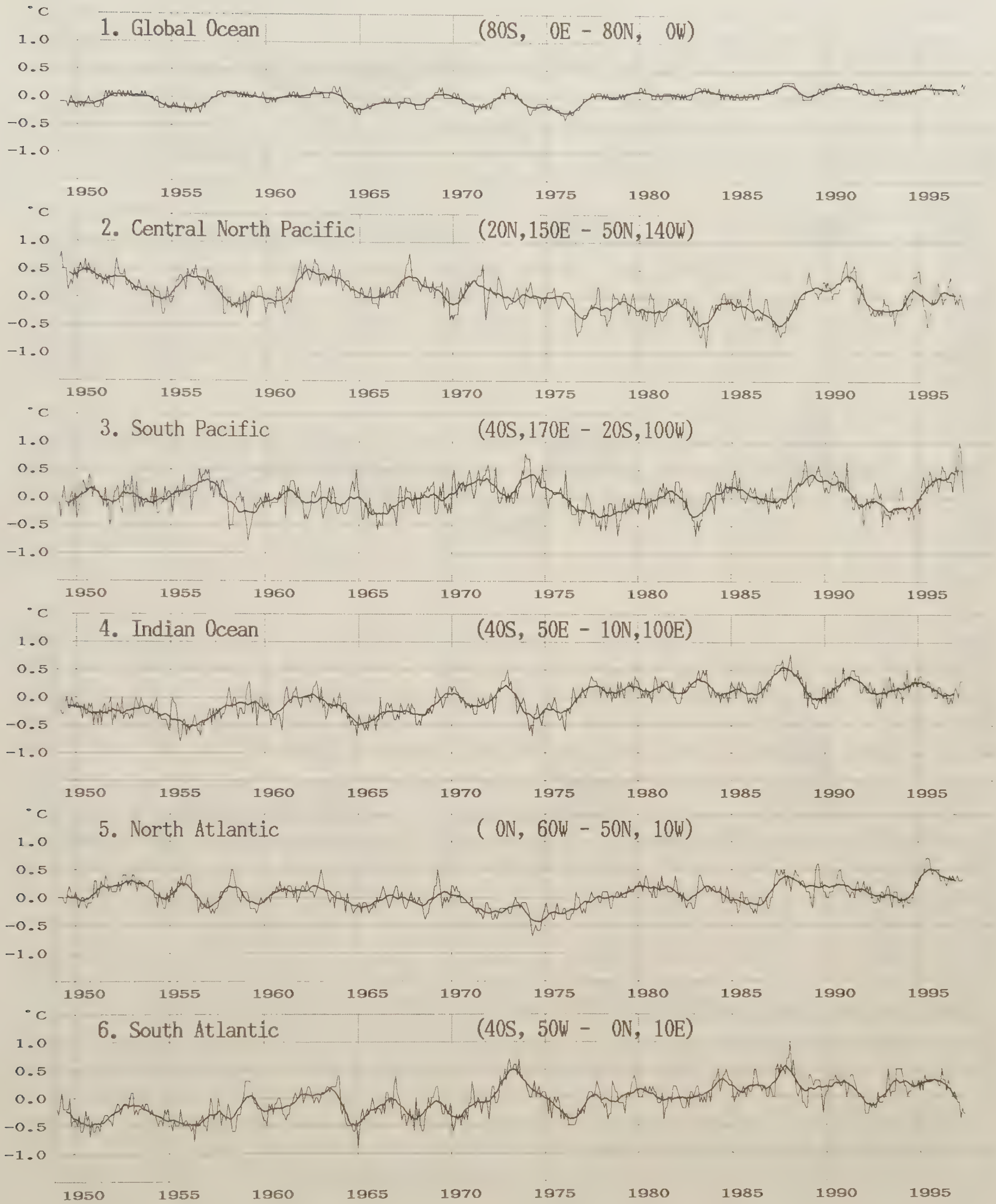
第21図　太平洋ブイ流跡図(1997年 5月)

Fig.21　Movements of drifting buoys in the Pacific Ocean during MAY 1997.
Each track is for one buoy. Small circles represent last positions for the month.



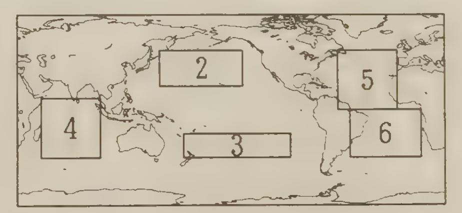
第22図　太平洋海面水位偏差図 (1997年 4月)

Fig.22　Monthly sea level anomalies for APR 1997 obtained from mean sea level (1975-1995) adjusted for atmospheric pressure. This figure is prepared by the SOC of ISLP-PAC, Dept. of Oceanography, Univ. of Hawaii.

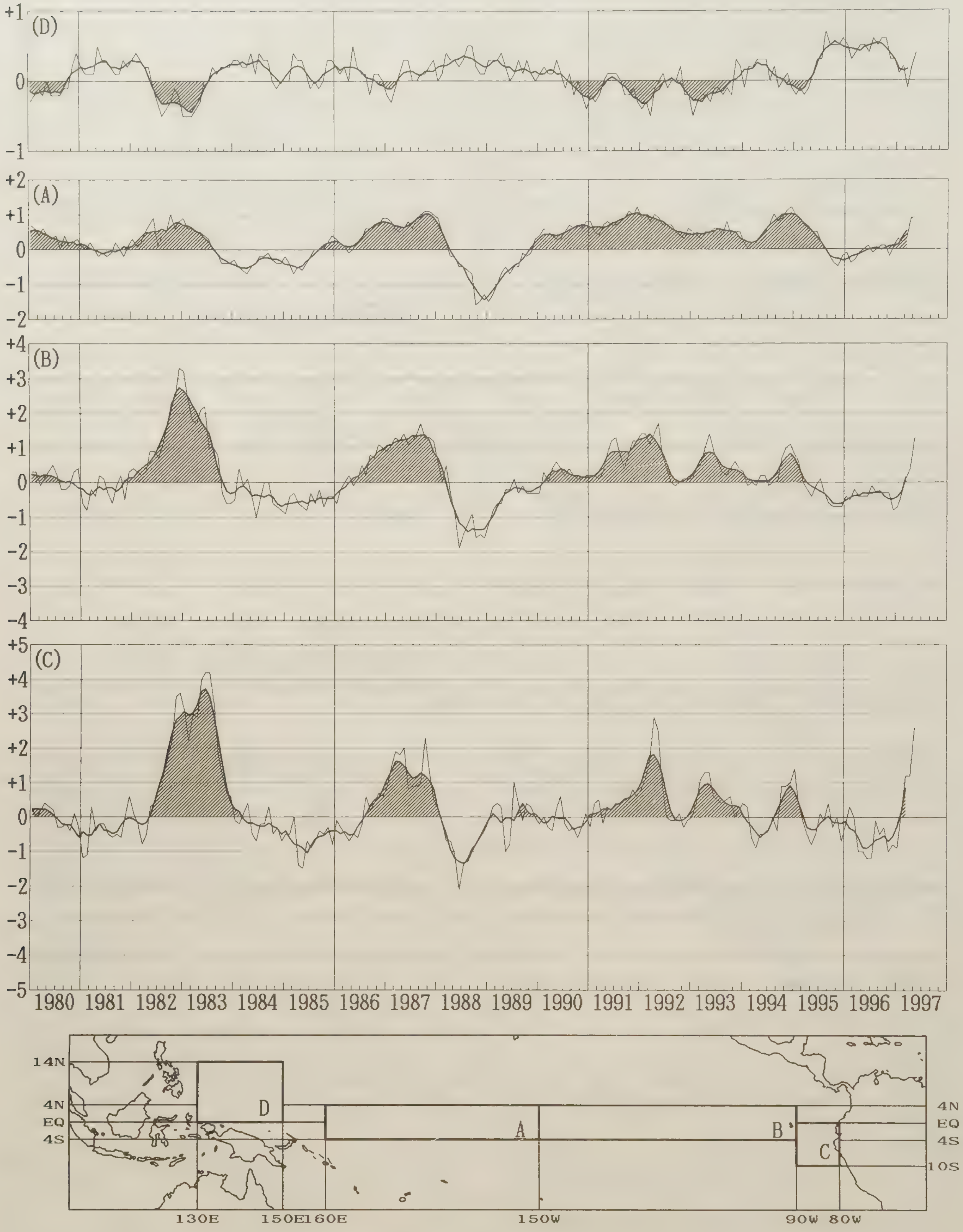


第23図 海域平均海面水温偏差の長期変動

Fig.23 Long-term variations of monthly mean sea surface temperature anomalies (°C) for the areas shown in the right panel. Anomalies are computed from the JMA climatology (1961-90). Thin lines show the monthly mean and thick lines their 13-month running means.



Time Series of Equatorial Pacific SST Anomalies



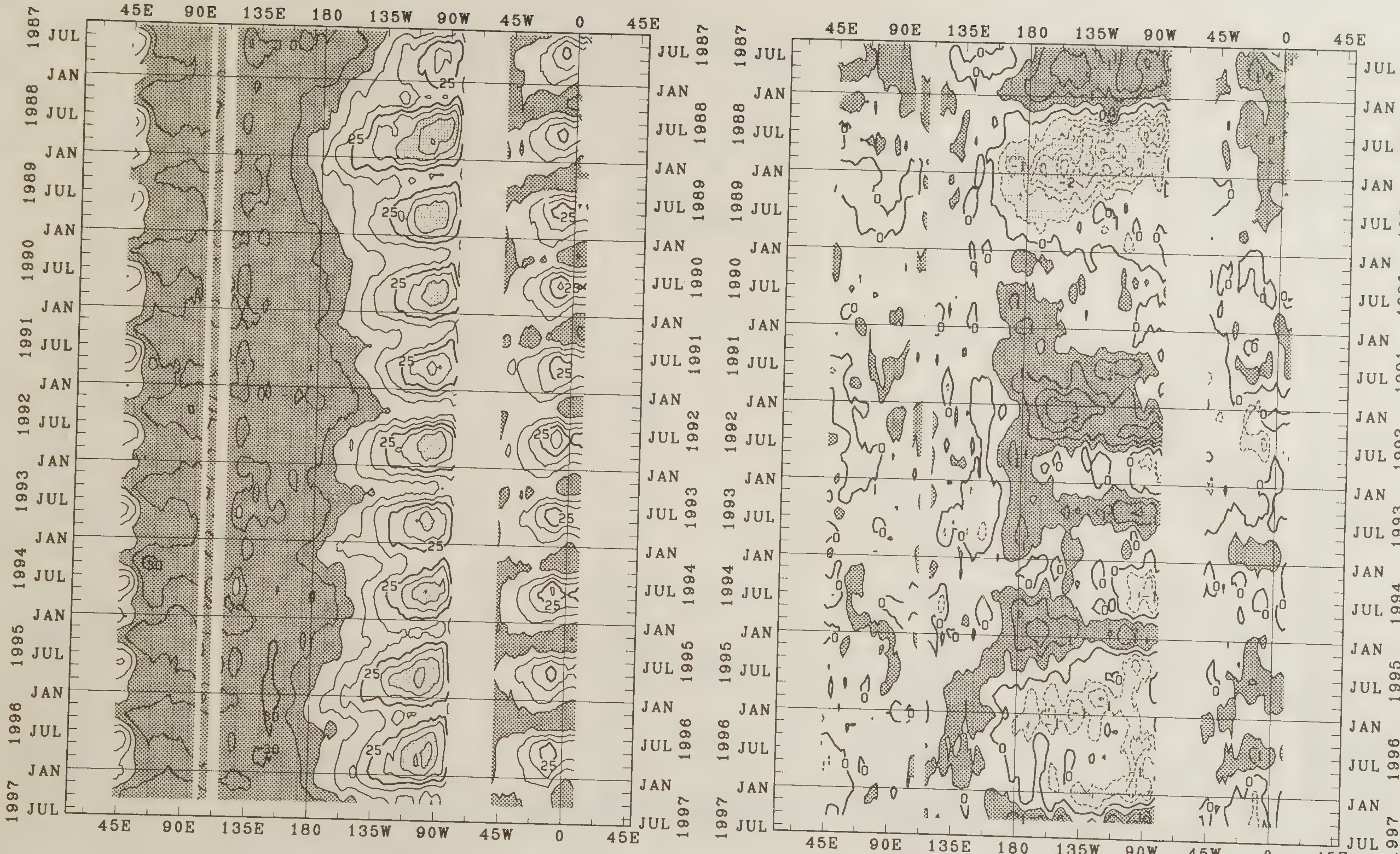
第24図　太平洋赤道域の海面水温偏差時系列図

Fig.24 Time series of monthly mean SST anomalies (°C) in the equatorial Pacific Ocean for the areas indicated at the bottom.
Thin lines show the monthly means and thick lines their 5-month running means. Positive anomalies (A, B, C) and negative anomalies (D) are shaded. Anomalies are computed from the JMA climatology (1961-1990).

MONTH	SEA SURFACE TEMPERATURE AND ANOMALY (°C) REGION D 14N-EQ 130E-150E		REGION A 4N-4S 160E-150W		REGION B 4N-4S 150W-90W		REGION C EQ-10S 90W-80W		SOI	SEA LEVEL PRESSURE ANOMALY (hPa) TAHITI 17-33S 149-37W	DARWIN 12-24S 130-52E
JAN 95	28.3	-0.2	29.0	1.0	26.2	0.8	25.7	1.4	-0.4	-0.3	0.6
FEB 95	28.2	-0.1	28.9	0.9	26.8	0.6	26.1	0.4	-0.2	0.6	1.1
MAR 95	28.2	-0.2	28.8	0.7	26.9	0.0	25.8	-0.1	0.4	0.3	-0.5
APR 95	28.7	-0.1	28.8	0.6	26.9	-0.2	24.6	-0.5	-1.4	-1.6	-0.0
MAY 95	29.2	0.1	29.0	0.5	26.2	-0.4	23.1	-0.8	-1.0	-0.7	0.6
JUN 95	29.6	0.3	29.0	0.5	26.0	-0.1	22.2	-0.5	-0.1	0.3	0.4
JUL 95	29.5	0.3	28.7	0.2	25.3	0.1	21.7	0.1	0.4	0.4	-0.4
AUG 95	29.8	0.7	28.4	0.0	24.3	-0.3	20.5	-0.1	0.0	0.4	0.3
SEP 95	29.7	0.5	28.1	-0.2	24.0	-0.6	20.7	0.4	0.2	0.4	-0.0
OCT 95	29.8	0.5	28.0	-0.4	23.9	-0.7	20.4	-0.3	-0.3	-0.7	-0.5
NOV 95	29.7	0.5	27.9	-0.5	23.9	-0.7	21.5	0.0	0.1	0.1	-0.1
DEC 95	29.5	0.6	28.0	-0.2	24.2	-0.7	21.9	-0.7	-0.5	-0.9	0.0
JAN 96	29.0	0.5	27.9	-0.1	25.0	-0.4	24.1	-0.2	0.8	1.0	-0.7
FEB 96	28.6	0.3	27.6	-0.4	25.7	-0.5	26.0	0.3	0.1	-0.2	-0.5
MAR 96	28.8	0.4	27.8	-0.3	26.7	-0.2	25.9	0.0	0.7	1.0	-0.3
APR 96	29.3	0.5	28.1	-0.1	26.7	-0.4	24.1	-1.0	0.8	0.5	-0.5
MAY 96	29.6	0.5	28.5	0.0	26.2	-0.4	22.9	-1.0	0.3	1.2	1.2
JUN 96	29.7	0.4	28.6	0.1	25.7	-0.4	21.5	-1.2	1.4	1.6	-0.2
JUL 96	29.8	0.6	28.4	-0.1	25.1	-0.1	20.4	-1.2	0.7	0.6	-0.6
AUG 96	29.6	0.5	28.4	0.0	24.3	-0.3	20.5	-0.1	0.4	0.4	-0.3
SEP 96	29.8	0.6	28.4	0.1	24.3	-0.3	19.8	-0.5	0.5	-0.7	-1.7
OCT 96	29.9	0.6	28.5	0.1	24.3	-0.3	20.4	-0.3	0.4	-0.1	-0.8
NOV 96	29.5	0.3	28.2	-0.2	24.3	-0.3	20.5	-1.0	-0.0	-0.5	-0.5
DEC 96	29.2	0.3	28.3	0.1	24.1	-0.8	21.8	-0.8	0.8	-0.3	-1.9
JAN 97	28.6	0.1	28.3	0.3	24.7	-0.7	23.4	-0.9	0.3	1.7	0.9
FEB 97	28.5	0.2	28.2	0.2	25.9	-0.3	25.9	0.2	1.2	1.0	-1.9
MAR 97	28.3	-0.1	28.4	0.3	27.0	0.1	27.1	1.2	-0.6	-0.5	0.9
APR 97	29.0	0.2	29.1	0.9	27.5	0.4	26.3	1.2	-1.1	0.4	2.3
MAY 97	29.5	0.4	29.4	0.9	27.9	1.3	26.5	2.6	-2.5	-2.1	0.9

第1表　エルニーニョ監視指数

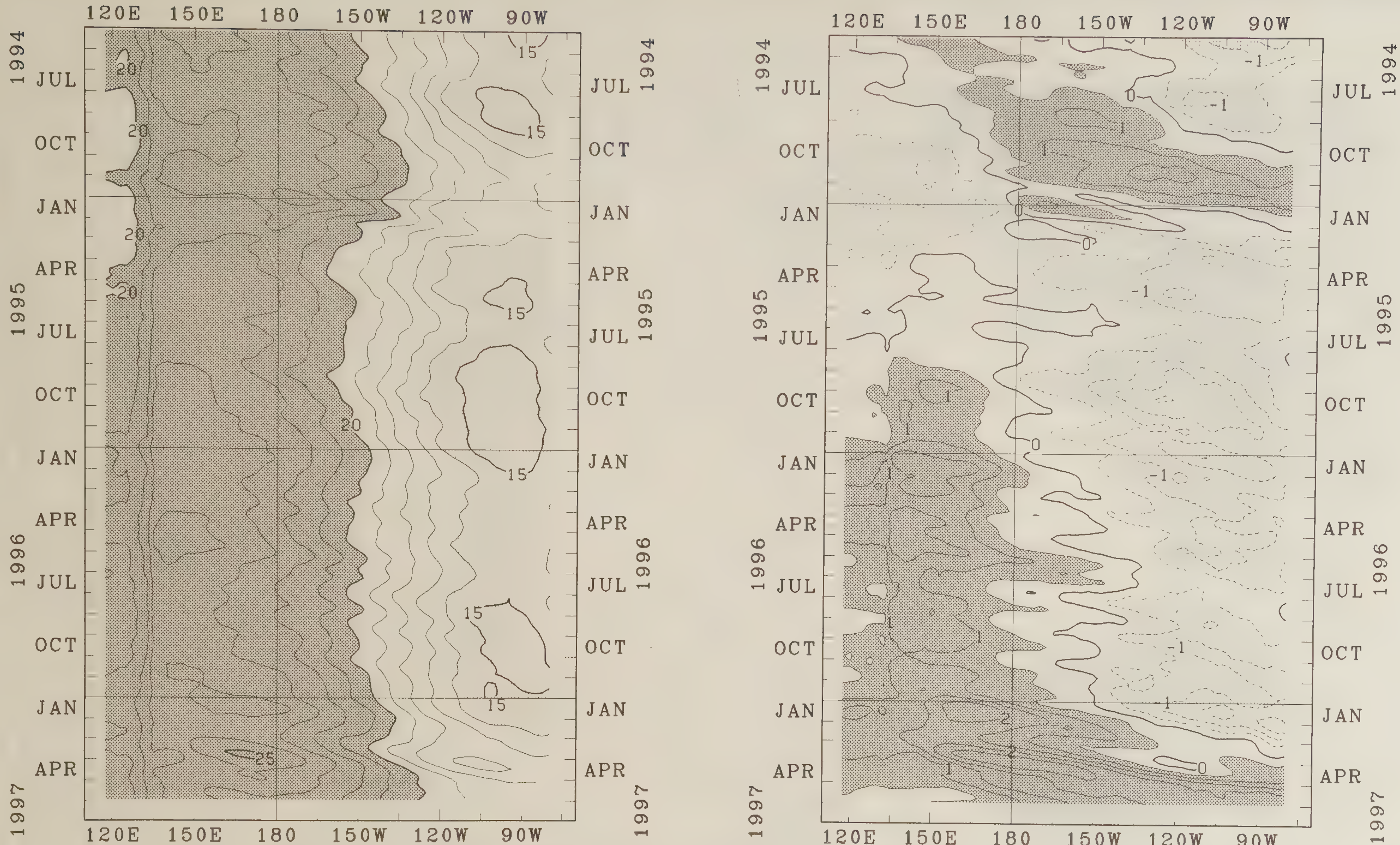
Table 1 El Nino Monitoring indices



第25図 赤道に沿った海面水温（左）および偏差（右）の時間-経度断面図

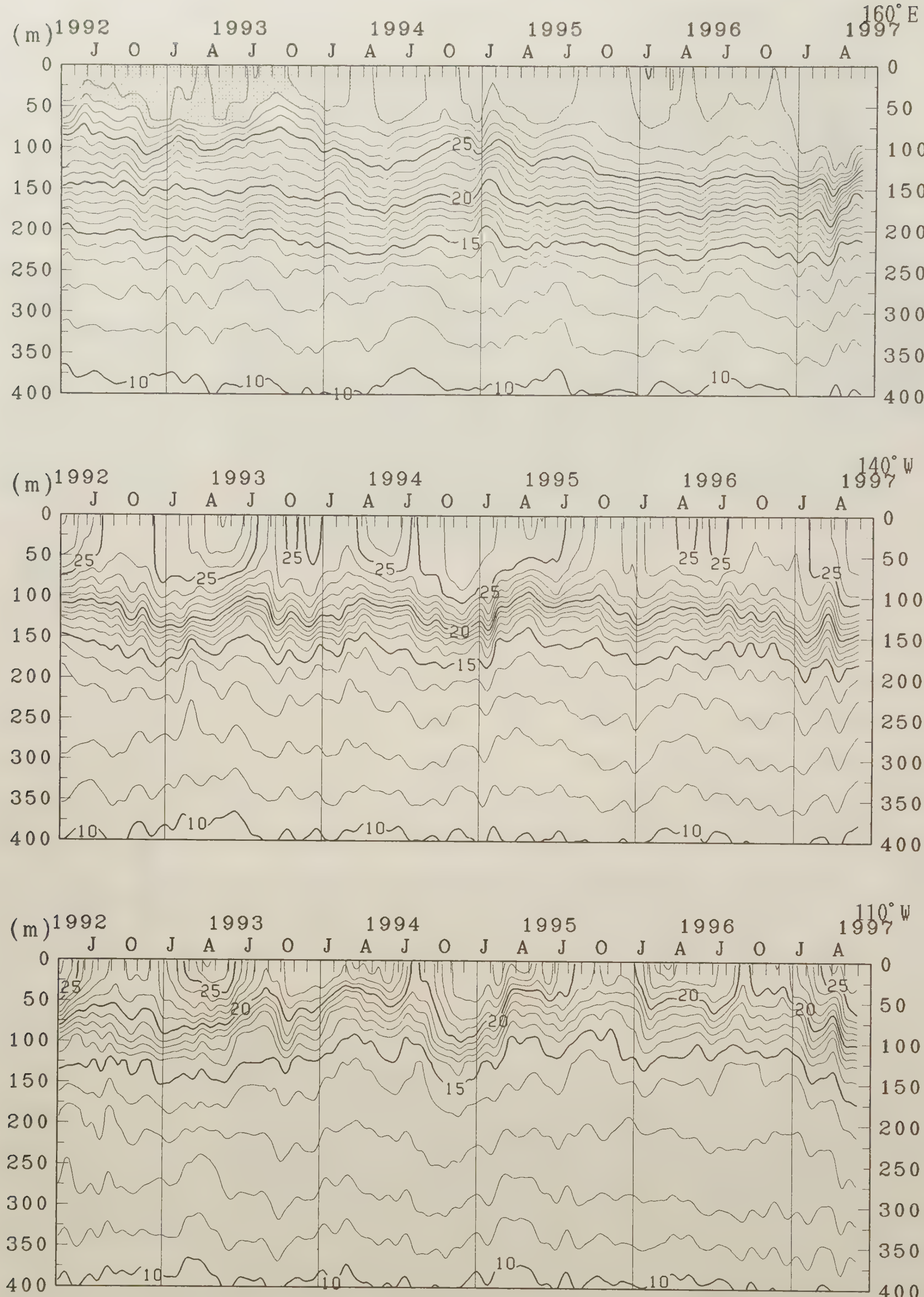
Fig.25 Time-longitude sections of SSTs (left) and anomalies (right) along the equator (2 °N-2 °S) in the global ocean. Contour interval is 1 °C (left) and 0.5 °C (right). Values in the left panel greater than 28 °C are shaded and values less than 23 °C are spotted. Dashed contours in right panel indicate negative anomalies. Anomalies are computed from 1961-1990 base period means.

Time-Longitude Sections of Ocean Heat Content & Anomalies (Eq.)



第26図　太平洋の赤道に沿う海洋表層の貯熱量（左）及び偏差（右）の時間－経度断面図

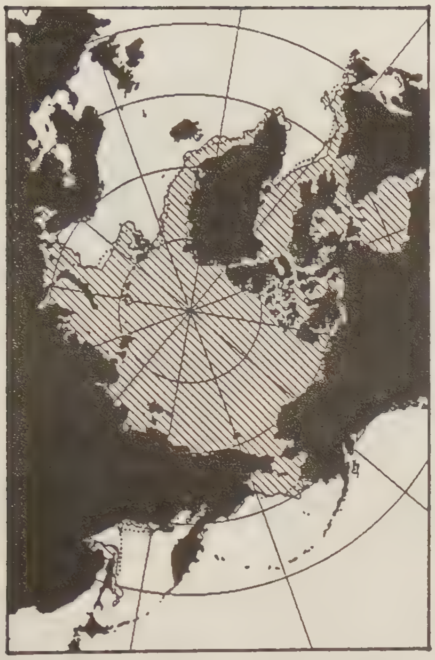
Fig.26 Time-longitude sections of ocean heat content in the upper 260m along the equator (left) and anomalies (right) in the Pacific Ocean. Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C (left) and 0.5°C (right). Values in the left panel greater than 20°C are shaded and values less than 16°C are spotted. Dashed contours in right panel indicate negative anomalies. Anomalies are computed from 1987-1995 base period means.



第27図　太平洋赤道域の表層水温の時間－深度断面図

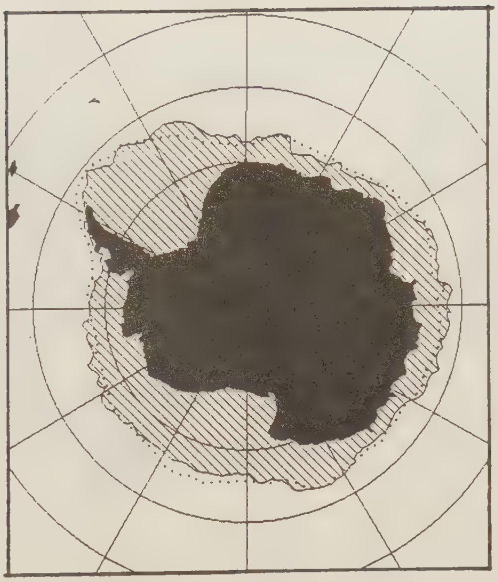
（上：西部、中：中部、下：東部）

Fig.27 Time-depth sections of equatorial subsurface temperature for the western Pacific (top, 160°E), the central Pacific (middle, 140°W) and the eastern Pacific (bottom, 110°W). Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C. Values greater than 28°C are shaded.



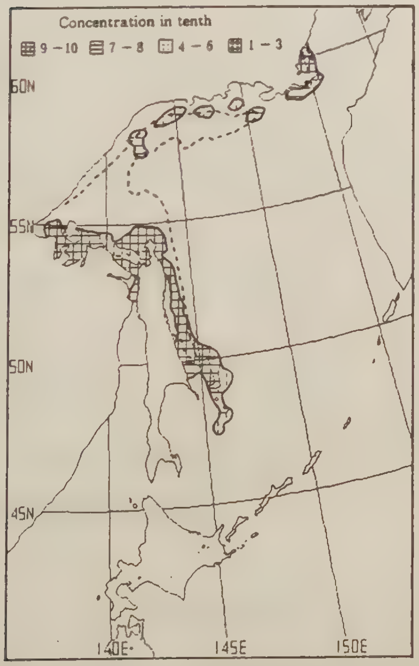
第28-1図　北極域の海氷図（1997年 5月16日）

Fig. 28-1 Sea ice chart in the Arctic on 16 MAY 1997. The area hatched represents the sea ice extent. The dotted line denotes the mean ice edge (averaged for the period from 1972 through 1990). The data source is the U.S. National Ice Center (USA).



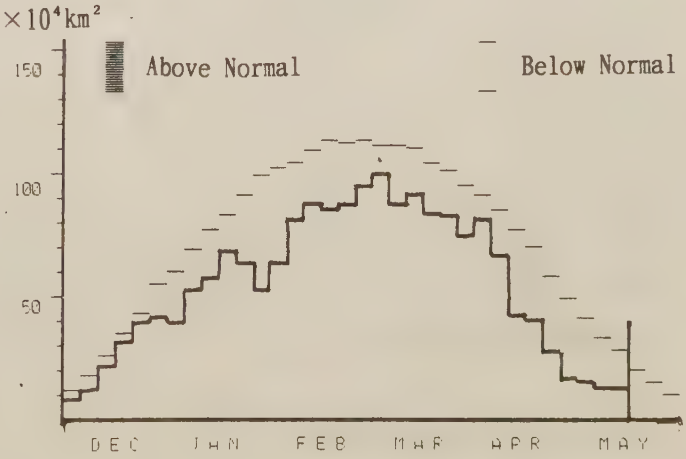
第28-2図　南極域の海氷図（1997年 5月16日）

Fig. 28-2 Sea ice chart in the Antarctic on 16 MAY 1997. The area hatched represents the sea ice extent. The dotted line denotes the mean ice edge (averaged for the period from 1972 through 1990). The data source is the U.S. National Ice Center (USA).



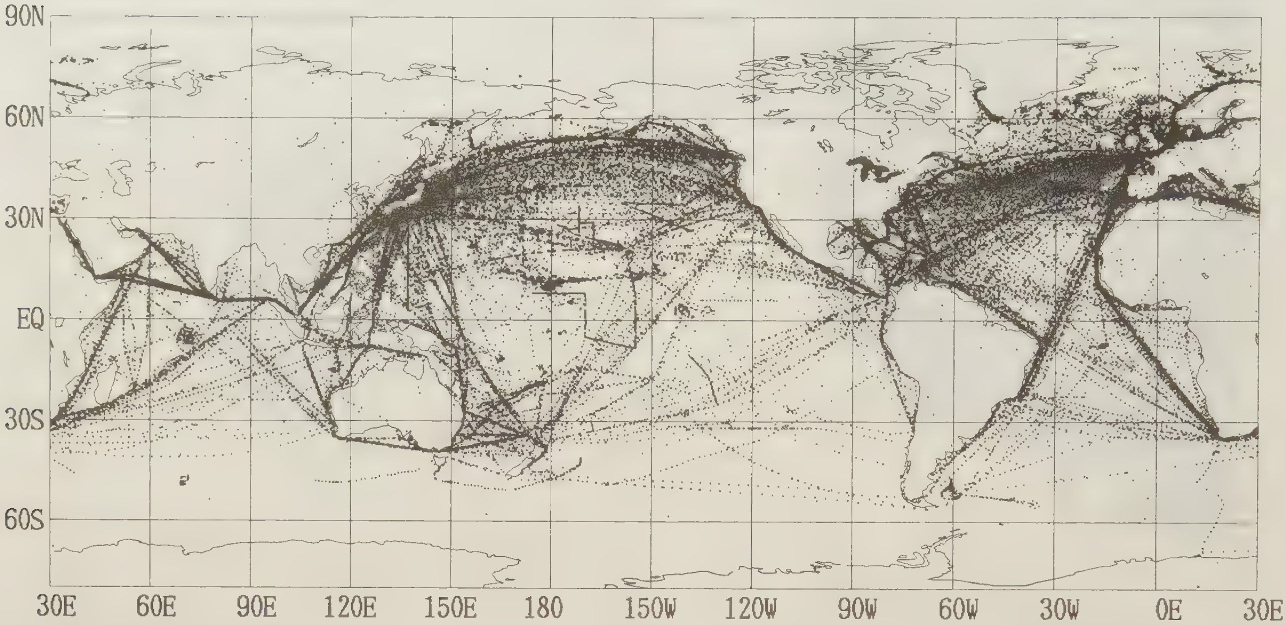
第28-3図　オホーツク海の海氷図（1997年 5月15日）

Fig. 28-3 Sea ice chart in the Sea of Okhotsk on 15 MAY 1997. The dotted line denotes mean ice edge (averaged for the period from 1972 through 1990).

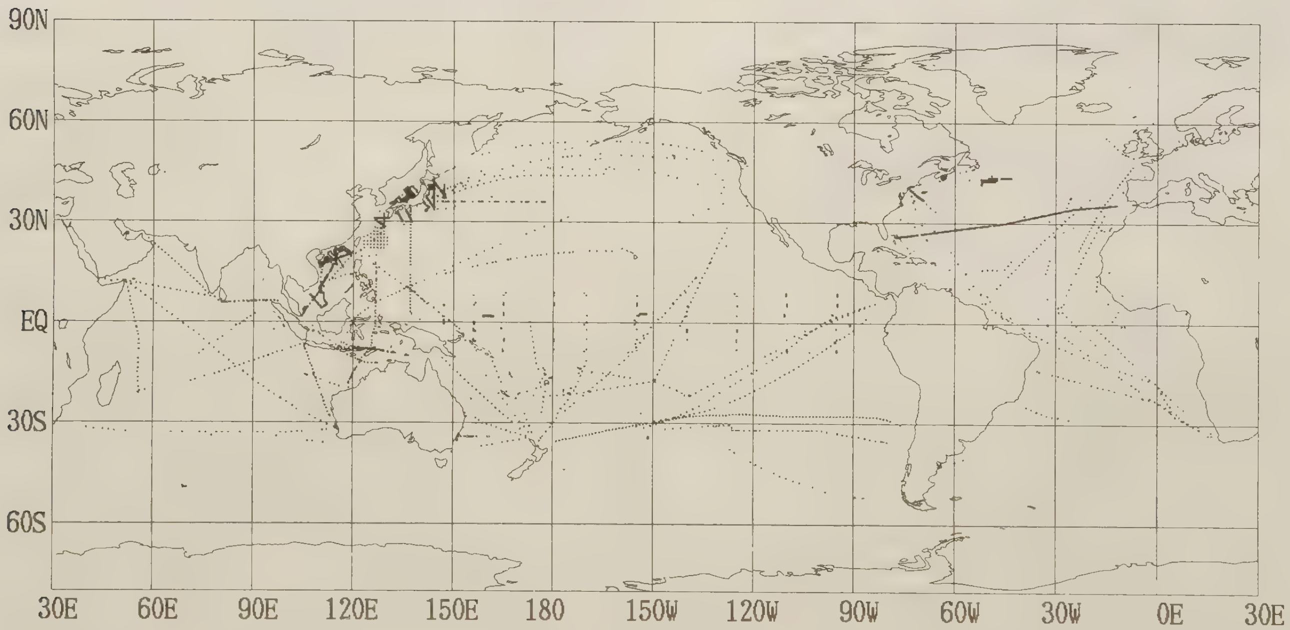


第28-4図　オホーツク海半旬海氷域面積（1996/97）

Fig. 28-4 Time-series of 5-day sea ice extent in the Sea of Okhotsk (1996/97).



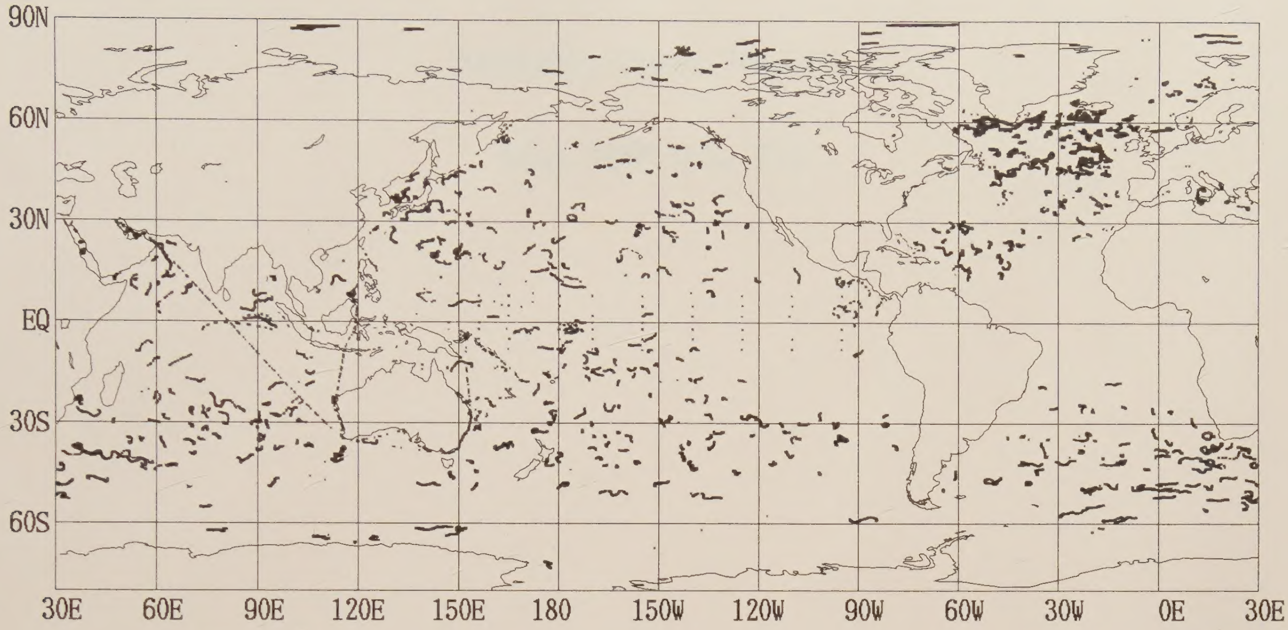
SHIP messages Total data:122512



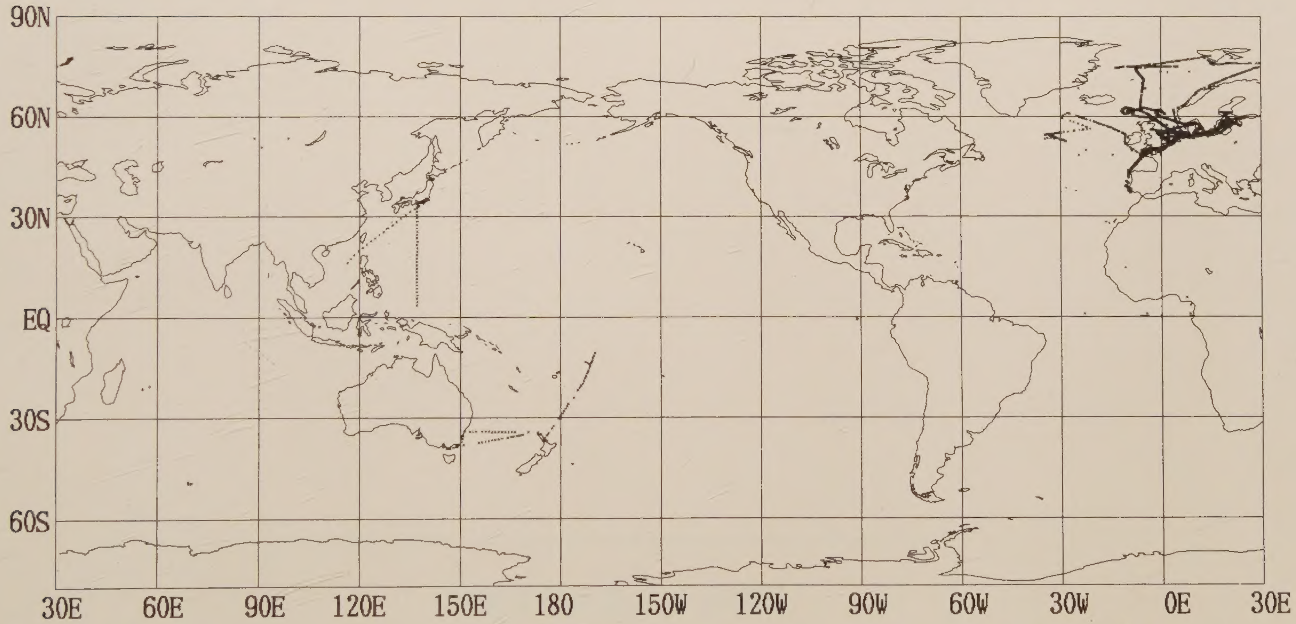
BATHY/TESAC messages Total data: 5008

第29-1図　測点分布図(1997年 5月)

Fig.29-1 Geographical distribution of SHIP messages (SST data, top) and BATHY/TESAC messages (subsurface temperature data, bottom) for MAY 1997.



BUOY messages Total data:196123



TRACKOB messages Total data: 4165

第29-2図 測点分布図(1997年 5月)

Fig.29-2 Geographical distribution of BUOY messages (buoy drift and SST data, top) and TRACKOB messages (ship drift and SST data, bottom) for MAY 1997.

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